A CONTEXTUAL APPROACH TO URBAN SUSTAINABILITY

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DECLARATION

I declare that this thesis has been composed by me and is my own work.

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ABSTRACT

The aim of this thesis is to contribute towards a general theory of sustainable urban form. More specifically, the thesis seeks to develop a conceptual apparatus that will ensure such theory is sensitive to the unique combination of spatial and temporal characteristics of each city.

The thesis consists of two parts. The first part identifies the conceptual framework of the sustainable cities discourse on the intersection of intellectual developments in environmentalism and urban planning. On the one hand, the discourse suggests the 'sustainable city' as a practical and spatially specific means towards the abstract and globally defined goal of 'sustainable development'. On the other hand, this discourse can be seen as part of a wider body of criticism of the principles and concrete expressions of modern urban planning. Physical urban form is one of the issues that appear to be in need of redefinition within the conceptual framework of the urban sustainability discourse. Theoretical and practical proposals towards sustainable urban form are reviewed critically in an attempt to highlight a number of theoretical problems that most such proposals share. The thesis argues that most of these proposals tend to detach physical urban form from the human processes that shape it and ground their tenets on the assumption of deterministic powers of spatial form on human behaviour. As a result, the city appears stripped from its contextual - geographical, socio-economic, cultural and institutional - dimensions and sustainable forms of supposed universal validity are prescribed. A working categorisation of the world's urban environments, based on the driving forces of their unsustainability, seeks to expose the futility of such universalistic and purely spatial approaches to cities.

Concluding the first part of the thesis is a series of generic steps that intend to describe a process of incremental transformation and/or development of urban form towards sustainability. Relinquishing universalistic models, this process uses the specific spatio-temporality of each city as its point of departure. The steps intend to be instructive to the development of sustainable urban forms, while not being prescriptive of any specific form.

The second part of the thesis employs the proposed generic steps, in order to explore possibilities of transformation of the unsustainable features of the city of Thessaloniki in Greece. Thessaloniki is studied as illustrative of the urbanisation process of Mediterranean European cities. In view of trends towards European integration of urban policy, the distinct case of these cities in Europe needs to be demarcated. An ecosystemic assessment of Thessaloniki's vital operational processes and a brief account of its planning history seek to illuminate the driving forces of the city's unsustainability, in a combination of spatial, socio-economic and institutional characteristics. 'Urban configurations', i.e. combinations of individual urban buildings that incrementally form the urban fabric, are identified as a crucial, but as yet ignored, scale of analysis and intervention towards Thessaloniki's sustainability.

Concluding, the thesis suggests a number of organisational principles that aim at increasing the reflexivity of the Greek planning framework, in general, and of development plans for Thessaloniki, in particular. In other words, these organisational principles seek to provide Thessaloniki's planning framework with the means to transform itself in response to changes in its own spatio-temporal context.

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INTRODUCTION

By the end of the 1990s, the widely acknowledged environmental crisis has spawned a variety of responses that reflect the complexity and interdependence of its constituent problems and the multiplicity of their perceived causes. Expressions of environmentalism correspond to different perceptions of nature and its value, different political and economic philosophies and different discursive domains. Solutions offered to the crisis vary accordingly, from calls for a transformed worldview that would reassign nature its pre-modern sacredness (Skolimowski, 1987, Nasr, 1966, etc.) to free-market environmentalism which seeks to assign nature conventional economic values and incorporate it to the market system (Pearce et al. 1989).

Since the publication of the Brundtland Report in 1987, the concept of 'sustainable development' has dominated official pursuit of environmental protection and has widened its scope to include issues that, until then, were perceived as external or even contradictory to this pursuit. Sustainable development combines purely environmental concerns with the plea for social equity across the planet and across different generations as well as with the imperative for further economic development in the conventional sense. The reconciling nature of sustainable development, along with the vagueness of its exact meaning in practice, has gained it endorsement by most national governments in the world and wide acceptance across the different expressions of environmentalism.

Cities have been identified as a means of pursuing the all-encompassing and globally defined goal of sustainable development. They concentrate half of the world's population and most of its industrial and economic activity. Thus, they present concrete manifestations of local environmental and social problems. Furthermore, the inherent dependence of cities on land beyond their limited territory makes them significant consumers of natural resources and contributors to regional and global pollution. Finally, the new role of large cities as the locus of global economy, the physical space where its operation is facilitated, reinforces the relevance of the urban focus to, and its potential instrumentality towards, the goal of sustainable development.

This thesis does not challenge either the value of the concept of sustainable development or the importance of cities in its pursuit. There is a genuine imperative for globally co-ordinated action in response to globally occurring physical, social and

economic phenomena and cities present a quantitatively crucial and qualitatively distinct scale of focus, in this respect.

Nevertheless, this thesis raises questions about the way sustainable development is validated as a global goal and in turn the way it is pursued as such. As a means towards operationalising sustainable development, 'sustainable cities' are imbued by the same definitive principles as the global goal and are legitimised by the same 'scientific facts'. Problems and contradictions within the sustainable cities discourse are seen, in this thesis, as the outcome of the encounter of the presumed globality of sustainable development to a reductionist interpretation of the nature of the city. It is argued that, the critical potential of the urban focus towards global sustainability is, thus, reduced or, in cases, reversed to produce regressive and counterproductive proposals.

Responding to the above, this thesis attempts to identify the definitive principles of a new conceptual apparatus for looking at cities with a view to addressing their operational problems, on the one hand, and instructing their function in a globalising world, on the other. In essence, the objective of this apparatus can be said to be the main objective of this thesis as a whole. It is intended to develop the sensitivity of any framework towards urban sustainability to the specific context it seeks to address.

The proposed conceptual apparatus is employed subsequently to study a specific urban context, the city of Thessaloniki in Greece. Thessaloniki is studied as an example of urbanisation process and urban form for which currently promoted models of urban sustainability are inappropriate and potentially counterproductive. It is also studied as a city within the European Union which needs to demarcate its specificity, in view of trends for integration of urban policy across Europe. Thessaloniki presents similarities of form and development process with many European Mediterranean cities, but a distinct case from cities in Western and Northern Europe.

This thesis consists of two parts and each part of four chapters. **Part I** presents a critical review of the sustainable cities discourse, with an emphasis on urban form. It raises theoretical questions and responds to them with the proposed conceptual apparatus for looking at cities, with a view to initiating their transformation towards sustainability. The thesis develops as follows:

Chapter 1 is a critical introduction to the concept of sustainable development. It sets out by exploring the variety of, often contradictory, meanings of the concept and continues by tracing its origins in early 1970s environmentalism. Although qualitative differences are identified between early expressions of sustainable development and its present official pursuit, the concept's global level of reference emerges as its constant definitive feature. Chapter 1 questions the validity of the globality of sustainable development, as defined in international documents and endorsed by many relevant publications, and highlights the practical problems that emerge as a result.

As a response to these practical problems, as well as to the vagueness of the concept's prevailing definitions, there have been attempts to translate sustainable development from an abstract goal to an operational practice. Chapter 1 provides a review of three of these attempts as well as of the idea of sustainability indicators which holds the same objective.

For the purposes of this study, Chapter 1 serves the following two functions. First, it introduces the concept that has spurred the development of a new discourse on urban issues, that is the focus of this thesis. Second, it highlights the definitive elements of this concept that have had a formative effect on the conceptual framework and, subsequently, the practical expressions of the sustainable cities discourse.

Chapter 2 aims at identifying the conceptual framework of the sustainable cities discourse. It begins by examining briefly the relationship between cities and nature from the advent of urbanisation until today. A qualitative and quantitative change in this relationship, initiated by the Industrial Revolution and exaggerated by the rise of the global economy, created the *rationale* for the sustainable cities discourse as well as its main rhetoric of reconciling city and nature. The definitive themes of the conceptual framework of the discourse are identified on the intersection of developments in urban planning and environmentalism.

The second part of this chapter reviews the urban issues that have crystallised as requiring redefinition within the new conceptual framework. Most of these issues arise from the employment of organic metaphors for the study of cities. Notwithstanding the holistic view of the city these metaphors promote, it is argued that they accommodate a reductionist interpretation of the city and, subsequently, a universalistic approach to its problems.

The intellectual problems of the urban sustainability discourse are expressed explicitly in the search for the sustainable urban form, which is the focus of **Chapter 3**. Models of sustainable urban form are examined according to the scale at which they draw their emphasis. They form part of comprehensive programmes towards urban sustainability, which, in turn, forms part of the global pursuit of sustainable development. After a critical presentation of proposals towards sustainable urban form, their common assumptions and intellectual problems are highlighted and links are traced between these problems and the conceptual framework of the sustainable cities discourse. It is argued that, prevailing models of sustainable urban form share common assumptions and problems with orthodox modern planning, to which, ironically, they strive to suggest an alternative.

Chapter 4 responds to problems identified in previous chapters, with a view to increasing the instrumentality of the urban sustainability discourse to change. In this pursuit, this chapter revisits the urban theories of Ralph Knowles and Kevin Lynch. The former's emphasis on incremental change induced through an institutional process and the latter's emphasis on the spatial as well as temporal nature of the city are seen as valuable contributions towards a 'theory of sustainable city form'.

Subsequently, a working categorisation of cities, based on the driving forces of their unsustainability is presented. The aim of this categorisation is to uncover the variety of spatial and temporal characteristics that constitute the unsustainability of different urban environments in the world. Hence, this categorisation attempts to expose the futility of the search for a universally valid sustainable urban form.

This chapter concludes with a draft of a new conceptual apparatus for looking at cities. This conceptual apparatus aims at facilitating incremental transformation of urban environments towards sustainability, taking the specificity of their spatio-temporal context as a point of departure. Its four definitive principles, namely contextuality, appropriateness of scale, reconciliation of form and process and reflexivity, are seen as generic steps towards urban sustainability.

The four chapters of **Part II** correspond to the four generic steps proposed in Part I. Each step is employed to examine the city of Thessaloniki with a view to initiating the process of its incremental transformation towards sustainability.

Chapter 5 attempts to identify the driving forces of Thessaloniki's unsustainability. Towards this aim it employs first the metaphor of the city as an ecosystem as a valid tool for examining Thessaloniki's present physical operation, rather than one containing inherently solutions. Subsequently, Chapter 5 presents a brief account of Thessaloniki's planning history, including recent responses of the national planning framework and the local authorities to the plea for urban sustainability.

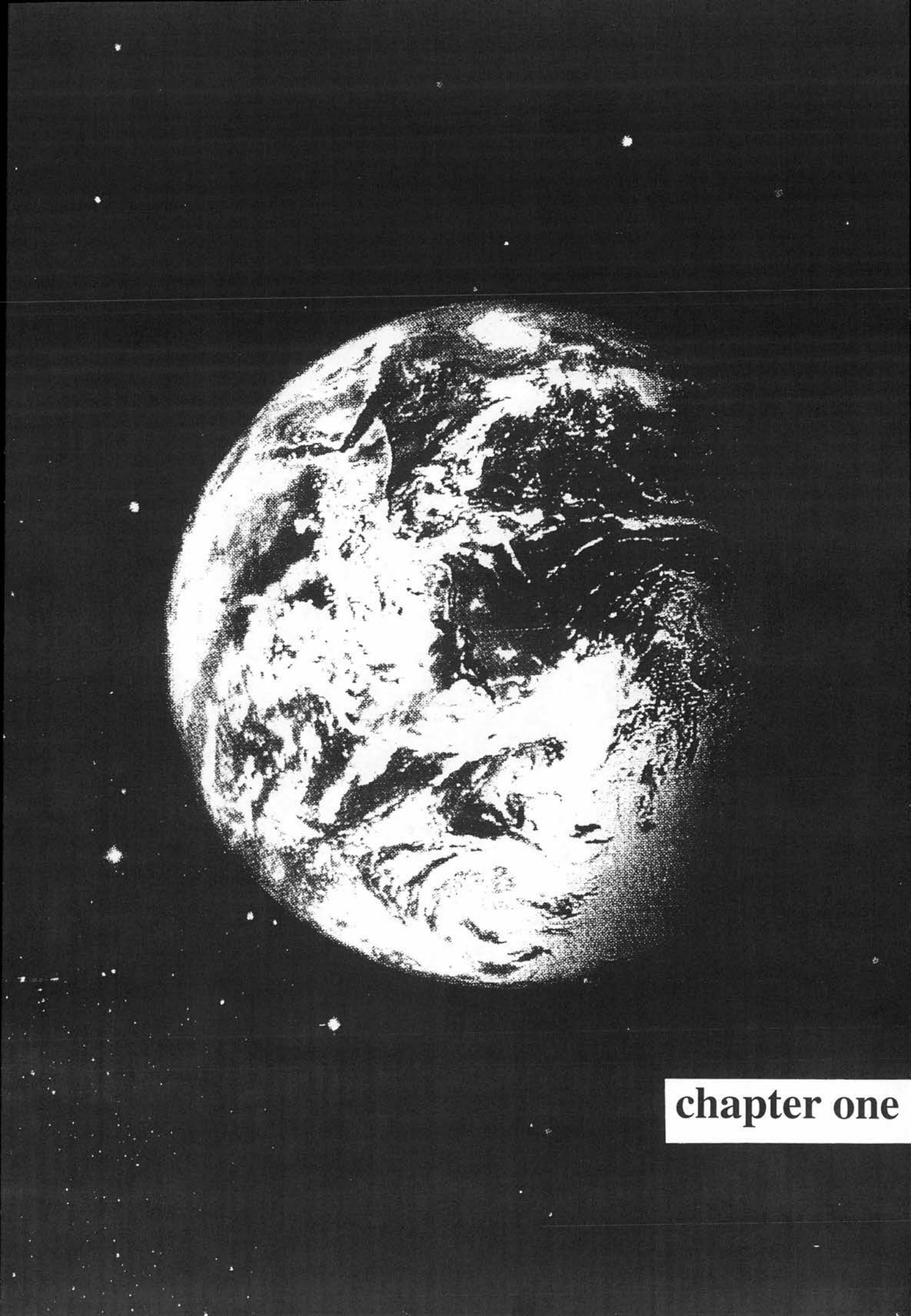
Having identified the driving forces of Thessaloniki's unsustainable operation and development, **Chapter 6** seeks to locate the scale at which intervention would be meaningful. Apart from the established scales of urban analysis and intervention, which are presented in Chapter 3, this chapter recognises the scale of 'urban configurations' as crucial for the city's environmental performance as well as its social and economic function.

Using 'urban configurations' as its scale of reference, **Chapter 7** presents an assessment of Thessaloniki's fabric with respect to sustainability. In this assessment features of form of four urban configurations are juxtaposed to features of their process of production i.e. of the social, economic and institutional mechanisms that have shaped them.

Finally, **Chapter 8** examines certain organisational characteristics of the national planning framework that controls and directs the development of Thessaloniki. These characteristics, it is argued, impede the framework's exposure to the spatio-temporal reality that it seeks to control and hence reduce its effectiveness considerably. A number of new organisational principles are put forward, as means of increasing the responsiveness of the Greek planning framework in general, and of plans about Thessaloniki in particular, to the contextual characteristics of the city. These principles are suggested as the appropriate means for the planning framework to transform itself in response to dynamic environmental and socio-economic circumstances.

Parts of this work have been presented in conferences in Belgium, the United Kingdom and Portugal and have been published in the respective conference proceedings and in *EAR,* the postgraduate research journal of the Department of Architecture, the University of Edinburgh (Athanassiou, 1998, 1997, 1996, 1996a).

PART I



chapter one

CHAPTER 1
SUSTAINABLE DEVELOPMENT: FROM THEORY TO OPERATION

1.1. Introduction

The concept of 'sustainable development' has been dominating the environmental discourse since 1987, when *Our Common Future,* usually referred to as the Brundtland Report, was published by the World Commission on Environment and Development (WCED, 1987). This Report defined the concept, outlined its theoretical content and suggested it as the only possible way forward for humanity. This chapter outlines briefly prevailing meanings of the term sustainable development and traces its origins in, as well as its divergence from, earlier expressions of the environmental discourse. Subsequently, an examination into the 'global' character of the concept raises theoretical questions regarding its inherent assumptions and means of legitimisation, as well as questions regarding its practical pursuit. The chapter concludes with a review of the ways that have been suggested, and often pursued, with a view to transforming sustainable development from an abstract concept to an achievable goal.

The objective of this Chapter is to identify the general theoretical ground from which the discourse of urban sustainability is driven, in order to embark, in the following chapters, on a critical investigation of this new, all-encompassing perspective of urban issues.

1.2. The Meaning of 'Sustainable Development'

'Sustainable Development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987, p43). This is the definition suggested by the Bruntdland Report and currently endorsed by international agreements and national policies, as a valid description of the directions international development should take in the light of global environmental degradation, the projected depletion of resources and the long unresolved situation of the world's poor. The idea underlying this definition and recurring in the Brundtland Report is that further development, in the conventional economic sense, is necessary in order to raise the living standards - to meet the 'needs' - of the poor of the world. This further growth, however, needs to be mediated with the imperative for environmental protection and social equity at a global level.

After setting the goal of meeting 'needs', the Brundtland Report qualifies on the 'basic needs' of the poor of the developing world, which currently present the world's 'principle development challenge'. These are the need for employment, food and energy as well as for housing, water supply, sanitation and health. Thus, the Report implicitly accepts the existence of a set of universally valid human needs. The latter is the precondition for formulating the idea of international human rights which 'provides a powerful yardstick with which to evaluate the performance of different societies in providing the material and procedural conditions for improving need-satisfaction' (Doyal and Gough, 1991, pp224). The validity of the universality of both ideas - of human needs and human rights - is often disputed[1].

The concept of sustainable development, without negating conventional economic growth, as measured by a country's Gross Domestic Product (GDP), questions its long-standing automatic association with human development. Habitual conception of development as synonymous to economic growth through industrialisation is often blamed for global environmental degradation. Moreover, this 'dominant development paradigm' is blamed for discriminating against, or impeding paternalistically, alternative ideas of development stemming from different, i.e. non-Western, cultural contexts (Shiva and Bandyopadhyay, 1989, in De la Court, 1990, p128-29). The Brundtland Report, without dispensing with the idea of conventional economic growth, calls for its qualitative change (WCED, 1987, pp52-54). It attempts to substitute an umbrella-concept, integrating social, economic and environmental concerns for the Western-style idea of growth. Judged against this new inclusive concept, the globe's divide into developed and developing world is challenged. The Brundtland Report was not the first international document to introduce sustainable development[2], but it was the one that disseminated it widely.

Inasmuch as the Brundtland Report has offered a general definition of an all-encompassing concept, and not much practical advice on how to pursue it, it has been followed by theoretical discussion which unravelled the several, often contradictory, directions this definition is able to contain. For example, there is an ongoing dispute over the notion of inter-generational equity that is implied in the Brundtland definition.

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[1] Arguments against the possibility of defining universal human needs originate from various areas of thought, ranging from the belief in individual preferences by free-market economists to that in cultural or biological relativism (Doyal and Gough, 1991, pp9-21). See also section 1.3.1., p24..

[2] The World Conservation Strategy of the *International Union for the Conservation of Nature and Natural Resources* first included a definition of sustainable development in 1980. For 'a gallery of definitions' exhibiting the openness of the term, see Pearce et al., 1989, pp173-185.

If, to be fair to future generations, the present one has to preserve the amount of existing environmental stock quantitatively unaltered, is it within the scope of sustainable development to substitute man-made stock (roads, bridges etc.) for natural? Many commentators argue that it is, counting optimistically on science and technology to resolve future problems arising from, as yet unforeseen, natural limits. Others find it an option inherently contradictory to the principles of sustainability. The two attitudes are representative of the 'weak' and the 'strong' view of sustainability respectively, and pertain to different economic and political persuasions and environmental ideologies (Pearce, 1993, Beckerman, 1995, Pepper, 1996 etc.).

Notwithstanding the wide acceptance of sustainable development as the common goal of humanity, and the transformations this invites in most fields of human activity, its actual meaning at the end of the 1990s remains blurred. It can be said, that it is this very vague character of the concept that has gained it such a wide acceptance. As David Reid observes 'sustainable development is rather like democracy or justice. People are generally in favour of it while retaining their individual definitions of what it actually means...No one openly advocates unjust practices - anymore than people come out in favour of unsustainability' (Reid, 1995, pxvi). However, the same feature of vagueness in the prevailing definition of the term has been seen as eliminating its practicability or even as indicating absence of a substantial, reformative proposal. Hard critic of the environmental discourse since its previous upsurge in the early 1970s, Wilfred Beckerman maintains that 'sustainable development has been defined in such a way as to be either morally repugnant or logically redundant', referring to the 'strong' and 'weak' definition of the term respectively. In his view, the former cannot be implemented as it may contradict the quest for meeting human needs, while the latter offers nothing but a technical criterion for assessing projects, without a necessarily positive qualitative value. It should be replaced, he suggests, by the traditional economic notion of 'optimality' or 'maximising welfare' if it is to have any influence in real policies (Beckerman, 1995, p125-140).

Conversely, in the seminal *Blueprint for a Green Economy*, David Pearce et al. (1989) argue that sustainable development is 'a feasible, practical concept' in so far as the traditional perception of environmental protection as an impairment to economic development is overthrown. They suggest the means of achieving sustainable development are (1989, p2):

- increased emphasis on the value of the natural, built and cultural environment,
- concern for the future in the short and long term, and

- emphasis on intra- and inter-generational equity.

In 1992, the *United Nations Conference on Environment and Development*, known as the *Earth Summit* in Rio, attempted to move the sustainable development discourse forward by surpassing theoretical queries and forging consensus on guidelines for action in pursuit of the common goal. *Agenda 21*, a document signed by over 170 national governments, aspired to become the global paradigm of good practice towards sustainable development. It presented a number of action areas, like international trade, demographic dynamics, human settlements etc., each of them with objectives, activities and means of implementation specific to it. Notwithstanding its more practical and action-oriented character, *Agenda 21* shared the theoretical framework of its precursor, the Brundtland Report, namely that further economic development is required but needs to be mediated with environmental protection and social equity at a global level. The signatories of *Agenda 21* have agreed to report their progress towards the common goal to the *Commission for Sustainable Development* that was also formed in Rio. In effect, the signatories only have a moral commitment towards *Agenda 21* and the other agreements reached in Rio, rather than being bound by a forcible international law (Quarrie, 1992). This lack of clear commitment on the side of the signatories, has raised questions regarding the success of the *Earth Summit*. Diverse interests across different national states played a role against reaching more specific and practicable agreements. However, the broad divide between rich and poor countries and between their respective understanding of environmental and development issues can be seen as the most important obstacles. Indeed, the *Earth Summit* cannot be said to have made substantial progress towards resolving these obstacles (Grubb et al., 1993, pp23-34).

1.2.1. The Origins of the Concept

Although the term has been popularised and officially promoted only since the Brundtland Report, its origins can be traced in the early 1970s environmental discourse. Examining briefly three influential publications of that period of environmentalism discloses certain enduring features of, as well as significant deviations from, early perceptions of sustainability.

In the 1970s, the global dimension of environmental problems was becoming discernible, and so was the widening gulf between the economic wealth of the developed countries and the poverty of the ones in the process of development. As early as 1957, carbon dioxide CO_2 levels in the atmosphere were a cause of concern

for potential global climatic changes (Grubb et al., 1993, p61). In 1962, the publication of Rachel Carson's *Silent Spring* alarmed the public with regard to the detrimental effects on human health of unrestrained use of chemicals in agriculture. Moreover, while economic growth in the developed world was continuing at unprecedented rates, international organisations, like the World Bank and the International Monetary Fund (IMF), and national governments were not only failing to address the problem of poverty of the masses of the developing world, but their practices seemed to exacerbate inequalities in resource distribution and environmental degradation. As a result, there emerged a distrust towards the existing patterns of growth and the first visionary programmes towards sustainable development. They were, rather, programmes towards a stable 'sustainable society', as further development was considered unnecessary and inevitably detrimental to society and nature, by theoreticians of sustainability of the early 1970s.

The three publications reviewed here illustrate the then prevailing perception of global unsustainability and the nature of the visions suggested in response. In general, exponential population growth and, its corollary, shortage of natural resources were seen as the main drives towards an anticipated global catastrophe. Freezing, or even reversal, of conventional economic growth was a constant feature of most proposals towards avoiding that destiny.

The Limits to Growth

The Club of Rome was founded in 1968 by an international group of scientists, businessmen and civil servants with the objective to promote an understanding of the 'varied and interdependent components that make up the global system' and subsequently to influence policy-makers towards new policies. In 1972, the Club published a report on its 'project on the predicament of mankind', aptly entitled *The Limits to Growth* (Meadows et al., 1972). That report alarmed the public with its predictions and caused much reaction against both the method it employed and its results.

As the title implies, the report suggests that there are 'natural limits' to human growth, whose current rates, if not transformed in time, are bound to lead to a global catastrophe featuring overpopulation, extensive famines and life-threatening pollution. The report is based on a computer model developed at the Massachusetts Institute of Technology (MIT). It provides detailed matrices, predicting the time span in which non-renewable resources will be exhausted - some are predicted to be depleted before

the end of the 20th century - and diagrams exhibiting the projected increase of pollution levels and their effect on average human lifetime. The authors of the *Limits to Growth* suggest a transition from 'growth to global equilibrium' as the way to avoid the Malthusian prophecy[3]. This no-growth state, although stable in terms of population and capital, will still be innovative in technological terms and will facilitate fair distribution of resources, and hence, social equity (Meadows et al., 1972).

A Blueprint for Survival

In a similar vein, the Malthusian destiny and faith in the no-growth resolution are central in another influential publication, also published in 1972. The *Blueprint for Survival*, which was a special edition of the magazine *The Ecologist*, declares the inevitability of change of current patterns of life and development, on the grounds of a scientifically proven environmental crisis and a widely felt breakdown of society. Change, the authors suggest, could occur either in a wilful and peaceful way or through a chain of massive natural catastrophes and social upheavals. Like *Limits to Growth,* validation of predictions as well as of proposals on how to avert catastrophe, is offered by 'objective' scientific models.

As the only chance to reverse the course of development towards a sustainable society, the authors of the *Blueprint* propagate pursuit of a well orchestrated, multi-tier programme. Decentralisation is given a pivotal role in this programme, particularly with regard to creating a new fair social system conducive to quality of life as well as environmental protection. Small, self-sustained and self-governed communities scattered in agricultural land are seen as the unit of social change. Further economic growth can only be detrimental to the environment (Goldsmith et al., 1972).

Small is Beautiful

Finally, *Small is Beautiful*, written by the economist E. F. Schumacher (1972), is another early programme towards sustainability, which has been very influential in the formation of the strand of thought promoting decentralisation. To begin with, the author suggests that a major transformation of the established economic system is required, in order to facilitate a qualitative change of life for everybody, combined with a lasting respect for the natural environment. In Schumacher's view, change has to originate from within the individual and to be practised locally. The current

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[3] Economist T.R. Malthus in *An Essay on the Principle of Population* published in 1798 suggested that population rises exponentially while resources increase linearly and hence, unless increase of population is restrained, shortages of food and resources should be expected.

economic system, he argues, needs to abandon its Western scientific positivism and become infused with traditional, religious values, such as Buddhist ones, instead. Schumacher's distrust of science differentiates him from the other two precursors of the sustainability discourse mentioned above, both of which based their predictions, as well as their visionary programmes for survival, on 'objective' scientific findings and on further technological development.

Schumacher's perception of sustainability is embodied in his 'economics of permanence'. The suggested economics will revolutionise the way nature is perceived by conventional production systems. It will challenge the enduring misconception of nature as a regular inexhaustible 'income' to replace it with an understanding of nature as a unique irreplaceable 'capital'. The 'Economics of permanence' will be based on cheap, small-scale and simple technology, rather than the centralised, largely automated and, hence, stultifying mode of production promoted by international economics. It will, thus, ensure creative work for the masses, without challenging the irreplaceable 'capital' of nature.

Although reform of economics is the principal drive, Schumacher's vision is all-encompassing as it challenges the very intellectual roots of current patterns of life and propagates alternative ones, spiritually more meaningful and fulfilling. Large scale is discredited in all its manifestations. Smallness of countries, organisations, businesses and communities is advocated not only on environmental grounds - small scale is assumed to have small impacts - but primarily on social and moral ones.

The authors of the *Blueprint* and of the *Limits to Growth*, along with those of other publications of the same period[4], are often grouped together by commentators of environmentalism as the Neo-Malthusians or the modern Malthusianists, because of their emphasis on global population growth and the concomitant scarcity of resources (O'Riordan 1976, pp52-65, Pepper, 1984, pp98-100). The Neo-Malthusians shared a pessimistic and deterministic view of the future of the environment. Global catastrophe was imminent and certain, unless action was taken. With the exception of Schumacher, relevant publications in the early 1970s also shared an over-reliance on 'hard' scientific data and mathematical models to record and predict environmental trends, as well as, to offer solutions.

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[4] Paul Ehrlich's *The Population Bomb* (1972), Herman Daly's 'The Steady-State Economy' (1973) and Garrett Hardin's 'The Tragedy of the Commons' (1973) are publications also representing the spirit of early environmentalism and its pessimistic and deterministic predictions.

In the early 1970s, concern for the environment had a visionary character related to radical social reform, challenging deep-seated values of western thought and striving to substitute 'social ecology'[5] for the prevailing capitalist order. Originating from the grassroots and aiming at participatory modes of government organised in self-sustained settlements, the new state would facilitate fairer distribution of resources as well as a sustainable relationship with nature[6].

Finally, further economic growth was not desired as it was anticipated to lead to inevitable natural and social disaster. The Western obsession with material progress, in Daly's term 'growthmania' (Daly, 1973, p149), was declared the intellectual culprit of the projected crisis and needed to be overthrown and replaced with new spiritual values. A variety of terms were coined to express what was in essence the same belief in the no-growth society, e.g. 'economics of permanence' (Schumacher, 1972), 'steady-state economy' (Daly, 1973) and 'state of equilibrium' (Meadows et al., 1972). Most proposals to avert global catastrophe, however, were utopian and a-political and did not suggest any realistic means in pursuit of their visions.

There are common threads linking early 1970s perceptions of the environmental crisis and their visions towards change to the current discourse on sustainable development. Roughly speaking, concern about future availability and distribution of natural resources in view of continuing population growth in the developing world, and wasteful production and lifestyle patterns in the developed, the degradation of the natural environment and growing social problems are still the main issues in the debate. Social, economic and environmental goals are still seen as intertwined and, hence, inseparable in their pursuit. The concept of sustainable development seeks to express the need for reconciliation between them.

In contrast to earlier expressions of environmentalism, which focused mainly on the protection of natural wilderness, environmentalism of the 1970s focused on global environmental threats, most notably the depletion of natural resources. Simply put, human development had to be accommodated within the earth's 'natural limits'. Globality was carried through and reinforced, by concomitant developments in

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[5] See also (Bookchin, 1974).

[6] Nevertheless, as Pepper (1984, p25) observes, the main (ecological) tenets of these proposals could not guarantee such a fairer society and could equally facilitate 'a socialist utopia or a fascist dystopia'. See also Harvey, 1996, p170-171.

economy and information technology, in the environmental discourse of the 1990s to become a definitive theme of the concept of sustainable development.

Finally, science is still the main source of validation of the causes of concern, of their projections to the future and of the official policy choices towards sustainable development.

1.2.2. Current Deviations

Notwithstanding common threads, there is a significant difference between the way integration of social, economic and environmental issues was advocated in the 'ecotopias' of the 1970s and the way it is promoted within the framework of sustainable development, in the 1990s .

The sustainable development discourse has a less idealistic and more pragmatic character. To a large extent, it is efficient management that is being advocated at present, rather than radical social reform. As economist David Pearce puts it: 'Sustainable development is more about changes of emphasis than a wholesale restructuring of decision-making' (Pearce, 1993, p10). Not every proponent of the environment would agree with the above statement. Notably, 'deep ecologists', advocators of conservation of all biotic and even non-biotic natural stock for its own intrinsic value and not for its utilitarian value for humans, argue for a radical transformation of current human values and the development of a new spirituality of quasi-religious content (see Naess, 1989, Skolimowski, 1987, etc.). Nevertheless, it can be argued that institutional moves towards, and prevailing perceptions of, sustainable development, at present, do not attempt to restructure society, but rather to amend the function of its institutions.

This feature is closely related to another significant shift. While the visionary programmes of the 1970s mistrusted central planning, advocating pursuit of the sustainable society through a series of small scale localised actions that would gradually transform society from the 'bottom-up', the current debate deviates from this ideal, actually pursuing sustainable development in an increasingly centralised way. International conferences and treaties, directives co-ordinating action between members-states of regional blocks, e.g. the European Union, and networks of cities extending over the globe are today's course of action.

The above deviation from early perceptions of sustainability represents a permanent conflict within modern political systems, between centralisation and decentralisation of government, between the 'top-down' and the 'bottom-up' approach to management and development. It is particularly relevant to the pursuit of sustainable development for two reasons. First, it impinges on the political reality in which the debate takes place, with forces of economic and cultural globalisation and national separatism acting vigorously at the same time. Second, the scale at which sustainable development is pursued is of critical importance; for too narrow a focus of action can be as ineffective as one that is too broad and general (Carley and Christie, 1992, p128-129).

The *United Nations' Conference for the Human Environment* held in Stockholm in 1972 can be mentioned as the initiator of a series of attempts for global co-ordination with regard to the environment. Though not very effective in this respect, that conference made a significant contribution to the theoretical framework of the official environmental discourse: the broadening of the term environment in order to include issues of development of the poor countries of the world. Addressing global environmental problems was not among the priorities of the developing world, which was concerned with raising the living standards of the poor by stimulating further economic growth. Global agreements on environmental protection were seen as an impairment to this goal, one imposed by the industrialised and polluting North. Nevertheless, environmentalism has not been a monopoly of the rich. There have been numerous expressions of concern for the environment in developing countries. This 'environmentalism of the poor', however, has focused on locally felt environmental degradation that affects the life, or even threatens the existence, of local communities, rather than on global but, as yet, unfelt processes (Guha and Martinez-Alier, 1997). Since Stockholm, the need to reconcile environmental protection with development has become central to the official environmental discourse.

In practical terms, the *Montreal Protocol on Substances that deplete the Ozone Layer*, produced by the United Nations in 1987, has been the first agreement addressing global environmental problems in global co-ordination. It targeted the phasing out of all production of CFCs (chlorofluorocarbons) by the year 1996. The Brundtland Report further invigorated the trend towards global action by offering the theoretical background for it.

The *United Nations' Conference on Environment and Development*, held in Rio twenty years after the one in Stockholm, was seen as the culmination of previous attempts for global co-operation. The outcome of the *Earth Summit* was two legally binding conventions and three non-legally-binding agreements, all signed by over 170 national governments[7].

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Agenda 21, is one of the non-legally-binding agreements produced in Rio. Although primarily addressed to international organisations and national governments, it emphasises the critical role of 'broad public participation in decision-making' and considers the involvement of all major social groups valuable. Hence, national governments are expected to devise effective mechanisms that will enable the active involvement in the process towards sustainable development of women, children, indigenous people and their communities, non-governmental organisations (NGOs), local authorities, workers and trade unions, businesses and industries, the scientific and technological community and, finally, farmers, drawing on the special knowledge and potential of each of these groups (Quarrie, 1992, pp191-208).

Agenda 21 appears to support vigorously the 'bottom-up' approach to sustainable development. This support seems contradicted by the fact that *Agenda 21* is an international official document drawn up by experts and signed by national governments. It is national governments that, following Rio, bear the responsibility to design policies, *inter alia*, to take advantage of the 'holistic, traditional, scientific knowledge' that indigenous people have of 'their lands, natural resources and environments', of the 'well-established and diverse experience, expertise and capacity' that NGOs possess (Quarrie, 1992, pp196-197), etc. Local authorities are urged to design their own *Local Agenda 21s*, following the guidelines set by the globally approved paradigm (Quarrie, 1992, p200). Hence, the process is to be initiated and controlled from the 'top-down' and not vice versa.

The same transfer of responsibility for initiating action from the grassroots to an international body of professionals can be traced in the evolution of some of the most prominent environmental activists' groups, internationally. *Greenpeace* and *Friends*

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[7] The two conventions produced in Rio are: the *Framework Convention on Climate Change* which commits signatories to devise policies aiming at stabilising CO_2 emissions at 1990 levels by the year 2000, and the *Convention on Biological Diversity*, which aims at protecting ecosystems and species world-wide. The non-binding agreements are the *Rio Declaration on Environment and Development* which presents 27 principles towards sustainable development, *Agenda 21* and the *Declaration of Principles on Forest* [see Quarrie (ed.), 1992, Grubb, et al., 1993].

of the Earth were both founded in 1970, in the United States of America and Canada respectively, arguably within the framework of that period's belief in the 'bottom-up' approach to change. These organisations were different from the then existing conservation groups, which were mainly interested in conservation of natural heritage and wilderness, both in their concern with a wider range of environment-related issues and in their agitating ways of protesting against them. At present, although faithful to their original concerns, *Greenpeace*, *Friends of the Earth*, and other groups of similar nature, have evolved into international, authoritative bodies with professional centralised administration. They conduct their own scientific research and publish their own reports regarding environmental trends according to which they direct their actions. Naturally, they have lost their spontaneity and their direct conduct with local communities and local problems, and developed instead an institutional structure with members spread in many countries of the world (Yearley, 1996, pp136-137).

The shift from 'bottom-up' to 'top-down' is not strictly operational, i.e. it does not simply constitute a change of attitudes with regard to the mechanisms appropriate for the pursuit of sustainability. It rather represents a major ideological shift regarding the very content of the concept: from idealism to pragmatism, from radical social reform to *ad hoc* managerial modification of course of action. The standpoint of economists towards the nature of the necessary transformations is revealing, in this respect. The seminal *Blueprint for a Green Economy* (Pearce et al., 1989), can be seen as the contemporary counterpart of *Small is Beautiful.* Both Schumacher and the authors of the *Blueprint for a Green Economy* stress the central role of economics to environmental protection. Their views, however, are diametrically opposed. Rather than propagating a radical change of values of the prevailing economic system and its infusion with Buddhist or other spirituality, the *Blueprint for a Green Economy* suggests that economics should extend its scope further to include natural resources and services, like clean air and diverse wildlife. Through 'environmental pricing' and market-based policy instruments, Pearce et al. argue, environmental protection and economic growth - two concepts so far considered incompatible - can become mutually beneficial (see section 1.4. of this chapter).

The latter reveals another divergence of the current debate from early expressions of sustainability. Further economic growth is not dismissed as inevitably catastrophic. In contrast to the anti-growth visions of the 1970s, the need for economic growth is recognised and endorsed in the current debate as a prerequisite for meeting the needs, mainly those of the poor in the developing world. Finally, the catastrophe anticipated

by *The Limits to Growth* and other publications of the early 1970s is currently seen as uncertain, moderate and much more distant in time. This does not indicate necessarily a critical change in hard scientific evidence with regard to environmental trends. It is rather another transformation of the theoretical framework of the environmental discourse. The doomsday scenarios of the 1970s were based on a deterministic use of scientific facts and projection models. Instead, the current discourse accepts the 'uncertainty' of scientific facts themselves and the need to act according to the 'precautionary principle'[8].

1.3. Sustainable Development as a 'Global Project'[9]

The popular slogan of the environmental discourse of the 1970s, 'Think Globally, Act Locally', expressed succinctly the visions of that period. Although the second part of this slogan needs to be modified in order to express today's centralised and internationally co-ordinated pursuit of sustainability, the first part still expresses accurately the prevailing perception of its content.

Strictly speaking, sustainability, as it is promoted in *Our Common Future* and *Agenda 21*, is a concept that is meaningful only at a global level. This is so, for the following reasons:

First, any smaller scale of reference cannot account for a number of environmental problems, like the build-up of CO_2 in the atmosphere, the depletion of the ozone layer, depletion of non-renewable resources etc., that are perceived as global i.e. as having global causes and effects. Also, a smaller area of reference, e.g. a national state, cannot account in a comprehensive way for problems, like acid rain or river pollution, which may originate in places distant from the place where they actually occur, across national boarders. Clearly, one reason sustainable development had to be defined as global is because of globally occurring, in physical terms, environmental problems.

Second, international trade and international division of labour are distributing environmental, social and economic effects globally. *Agenda 21* typically refers to unfair trade between the developed and the developing world as a cause of unsustainable economic development and environmental degradation for the

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[8] :'...the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'. This is one of the principles of the *Rio Declaration* (Grubb et al., 1993, pp88-89)

[9] See (Harvey, 1992, p52).

developing world. Multinational corporations and the location of their production plants is another globalising factor, operating at a supranational level and generating huge environmental, social and economic repercussions. In other words, the increasingly global operation of the economy makes any smaller scale of reference for sustainable development inappropriate.

Third, by means of globally operating economic processes sustainable development can be simulated for a smaller level of reference by imposing unsustainability on areas external to that level. For example, a country concerned with the state of its environment can maintain its natural stock by importing resources from countries which have environmental protection lower in their policy priorities. It can also locate its most polluting industries in such, typically poorer, countries and thus avoid many environmental hazards without challenging the state of its economy. Therefore, sustainability at the level of a country can be 'imported' (Clayton and Radcliffe, 1996, p92). The same practices, however, considered at the global level are obviously not sustainable as they contradict both the quest for concern for the environment and the quest for intra- and inter-generational equity.

Inasmuch as there are environmental and economic processes operating globally, any smaller scale area of reference for sustainable development would have exogenous processes affecting its function. Therefore, globality is a definitive feature of the term sustainable development. A number of questions can be raised with regard to this feature.

1.3.1. Theoretical Questions

The first question concerns the validity of the first globalising agents of sustainable development i.e. the globality of environmental problems. Although sustainable development clearly has a social and economic component, it is the environmental threats against the future of a finite planet that have engendered the concept and are, at present, the most central to the discourse.

However, the global character of even such genuinely global problems, like the accumulation of carbon dioxide (CO_2) in the atmosphere, can be shown not to have the same effect around the globe (Yearley, 1996, p78). Variations depend on geographical location as well as on economic welfare. For example, both the Netherlands and Bangladesh are bound to experience the anticipated sea rise much more intensely and catastrophically than other countries, as their territories are already

lower than sea level. Among these countries, however, the Netherlands have the economic and technical means to act with precaution and possibly eliminate the effects. Bangladesh and other poor countries with similar geographical disadvantages do not have this possibility. The depletion of the ozone layer is another problem of inherently global nature, whose projected effects can be shown to have great variations in different geographic latitudes. Therefore, the interests involved in common action towards sustainable development are not universally homogeneous.

Moreover, the objectivity of scientific facts, validating the globality of environmental problems, can be questioned. Yearley describes the dispute over calculations of CO_2, concerning the same year and the same countries, between an American and an Indian research institute. Five out of the ten most important CO_2 emitters in the world for the year 1987 were developing countries, according to the scientists of the American World Resources Institute (WRI). The Indian Centre for Science and Environment (CSE), however, challenged the result suggesting that it would have been dramatically different had per capita 'shares' of the global stock of natural sinks been taken into account, had a distinction been made between 'luxury' and 'survival' emissions, let alone ambiguities and incompatibilities between countries with regard to the way the emissions had been measured (Yearley, 1996, pp102-115).

In general, sustainable development discourse draws evidence from supposedly objective scientific 'facts' to prove, for example, that, although consensus is not yet reached with regard to the time span, the intensity and the chain effects of the build-up of CO_2 and of other greenhouse gases in the atmosphere, this trend will eventually affect the entire globe. Therefore, it is in everybody's interest to attempt to reverse it. Indeed, among all environmental, social and economic issues originally identified as pertinent to sustainable development by *Our Common Future* etc., it is the accumulation of CO_2 and the projected climate change that have now gained the most central position. In turn, it is scientific research conducted by agents like the Intergovernmental Panel on Climate Change (IPCC) that is presented to be the most central influence to policy choice (Wynne, 1994, pp169-171). 'While criticising the domination of life by science, ecologists use science to oppose science on behalf of life. The advocated principle is not the negation of knowledge, but superior knowledge' (Castells, 1997, p123). The introduction of the idea of 'uncertainty' and, its corollary, 'precautionary principle' in environmental discourse suggests some progress has been made since the scientific determinism adhered to in the early 1970s. 'Uncertainty', however, does not imply incredulity towards the objectivity of natural

science. It simply accepts the complexity and interdependence of the problems which prevent, or simply delay, scientists from forging consensus.

The reliance of the whole of the environmental discourse, from its early days until today, on 'objective' science in order to 'legitimate' its tenets seems evasive of ground-breaking developments both in the theory of science, through the writings of Thomas Khun, Karl Popper and others, and in the practice of scientific research itself through, for example, the development of quantum mechanics (Beck, 1992). Science has in many ways exposed its own limits and cannot not assert itself as objective and neutral. As Beck puts it (1992, p163),

> it is not their failure but their success that has dethroned the sciences. One could even say the more successful the sciences have operated in this century that much faster and more thoroughly have their original validity claims been relativised.

Investigating the condition of knowledge in the post-industrial - or postmodern - age, Lyotard goes further to identify science as only another 'language game' with no superiority in its claims to knowledge among other games. In Lyotard's view, scientific knowledge has not only been 'relativised' - as Beck puts it. It is only a 'kind of discourse' in a multiplicity of heterogeneous discourses (Lyotard, 1984, p3). In this context, the scientific consensus, that the environmental discourse is seeking, is 'an outdated and suspect value' (Lyotard, 1984, p66). The way the environmental discourse employs scientific research seems evasive of both the above bodies of criticism of science.

In the context of this thesis, reference to the 'relativisation of science' or even its 'delegitimation' (Lyotard, 1984) does not attempt either to denigrate the physically genuine global nature of certain environmental problems, or the important role of scientific research in identifying and in addressing them. It intends to pinpoint the multiplicity of open options, not only with regard to pursuing policies after scientific 'facts' have been gathered, but in identifying the 'facts' themselves. Even the prominence of certain problems as critical for the future of human life on the planet is not indisputable. It has been argued that, the very choice of problems of global significance conceals a bias in favour of the developed world, as it tends to marginalise problems equally global in scale but typically experienced by the developing world. Elliott (1994, p99) writes:

> It is the immediate adverse effects on survival of the urban poor of such basic processes as cooking, washing and working which ensure that the environmental challenges at the household level are of no less global proportions than global warming itself. Yet it is issues of the 'global commons' such as climate change which have received the bulk of attention of environmental planners in both the developing and developed nations todate. This priority is not surprising; in the developed nations, most of the regional, city, neighbourhood and housing related environmental problems...have been addressed. It is global concerns that are now likely to have the greatest impact for Western economics and people and it is these that have come to dominate Western thought when considering environmental problems of the cities of the developing world.

In turn, international agreements and treaties concerning the environment appear to be firmly grounded on hard scientific data, treating them as an impartial and universally shared language. Typically, the vast majority of guidelines towards sustainable development, introduced by *Agenda 21*, need to be operationalised by national governments of the developing world, while the role of developed countries is to facilitate the process of transforming the course of global development. It is true that, in Chapter 4 of Section 1 of *Agenda 21*, the unsustainable patterns of consumption and production fostered in the industrialised world are, for the first time in an official agreement document (Grubb, 1993, p106), blamed for the continuing deterioration of the global environment and for the exacerbation of imbalances in resource distribution and, hence, for the aggravation of world poverty. Consequently, a shift of the developed world towards more frugal lifestyles and sustainable production methods is called for [Quarrie (ed.), 1992, pp58-61]. Notwithstanding this acknowledgement of the original and current cause of most environmental problems, the onus of resolving them falls disproportionately on the developing world that is, thus, averted from pursuing the development path that has made the rich industrialised world prosper.

It follows that the scientific manner in which certain environmental problems have been acknowledged as global and hence spurred the imperative for acting in unison for *our common future* is inherently neither indisputable nor objective and arguably contains a strong bias in favour of the developed world.

The latter reveals another question raised by the globality of the term sustainable development. Legitimated by the supposedly universal validity of science, the discourse introduces the common goal of sustainable development as a new unifying 'metanarrative'[10], as a 'global project' affecting the life of all humans. Interestingly,

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10 Metanarratives: Large scale theoretical interpretations purportedly of universal application (Harvey, 1992, p9).

contemporary philosophical thought holds 'incredulity towards metanarratives' as the single most characteristic feature of the 'postmodern condition of knowledge' (Lyotard, 1991, pxxiv). The question is whether it is possible and legitimate to pursue such a 'unified representation of the world' in an era of multiple heterogeneous and fragmentary discourses. Seen from the postmodernist perspective, any such pursuit would not only be 'repressive or illusionary', but also 'self-dissolving and self-defeating' (Harvey, 1989, p52). Within the framework of the 'metanarrative' of sustainable development, national, social and cultural identities are all superseded by a global identity. This is not the identity forged by the mass media, communication networks and increased human mobility, all of which tend to homogenise lives and cultures into a global one. It is a global identity created by the sense of equally partaking to the future of a common finite planet.

In turn, scientific research, conducted by international agents such as the World Watch Institute which produces an annual report on environmental trends and problems, entitled aptly the *State of the World*, attests to the validity of our global citizenship. Meadows et al. (1992), in their sequel to the *Limits to Growth*, entitled *Beyond the Limits* and based on the same computational model as its precursor, declared, as the title suggests, that in many respects the earth has already crossed the limits of sustainability. James Lovelock (1979), with his Gaia hypothesis, offered a favourable scientific ground with metaphysical repercussions for the universalistic project of sustainable development. He suggested that the earth is a living organism with quasi-biological mechanisms controlling and sustaining life on it, despite significant changes in the surrounding environment e.g. huge fluctuations in the amount of solar energy reaching the earth. In all the above cases, science is employed to prove and enhance the global identity which is a *sine qua non* for the pursuit of the 'global project'.

Finally, the concept of 'needs', employed in the most widely quoted definition of sustainable development, that of the Brundtland Report (see p8), is another universalising agent of the discourse. Human needs are presented as knowable and homogeneous across different cultures and societies. They, thus, constitute another component of the promoted global identity. Similar conceptions of universal and objective human needs, however, have offered ideological background to cultural imperialism, i.e. to attempts to impose standards of living of the dominant - culture, race, gender, etc. - to the less powerful with the pretext of objectivity (Doyal and Gough, 1991, pp13-16). Without endorsing cultural relativism, it should be pointed out that the universality of human needs requires a more cautious formulation, one

with increased awareness of cultural, societal and other variations in needs and their 'satisfiers' (Doyal and Gough, 1991). In the opposite case, the sustainable development discourse runs the danger of promoting paternalistically the 'dominant pattern of development' to which it seeks to suggest an alternative.

To conclude, the 'global project' of sustainable development is grounded on supposedly impartial science which has long been challenged by scientists themselves. This assumed impartiality helps to conceal socio-economic objectives and biases, most notably in favour of the developed world, embedded in the very choice and definition of problems as well as in the policies towards their solution.

1.3.2. Problems in Practice

The practical question arising from the global character of sustainable development is the level at which it should be pursued. Global action towards it, albeit necessary, is not always possible and in most cases not sufficient. Notwithstanding the abundance of internationally operating organisations, none holds a forcible legislative authority. Hence, signatories of international treaties are committed only morally to the principles of the treaties and are not legally bound. Therefore, the appropriate structures for pursuing sustainable development globally are not available. Instead, most of the issues involved with sustainable development fall into the sovereignty of smaller bodies like national governments, regional or local authorities, which, however, are unable to perceive and address the entirety of the problems manifest within their administrative territory.

In addition, international co-ordination encloses the danger of generalisation and simplification of complex problems, with different manifestations in different geographic and economic environments. Counterproduction is also a possible prospect because of the inevitable bias of every treaty in favour of the most, politically or otherwise, powerful stakeholder. The task to compile data on natural habitats, resources and pollution of all member-states of the European Union is an example. The aim of this initiative has been to produce comparable data, and hence adopted one uniform, 'neutral' method for all member-states. This method, however, produced misleading results because it was actually formulated in Northern Europe and tended to underestimate the importance of habitats mostly encountered in Southern member-states, like Greece and Spain (Yearley, 1996, pp122-4).

Therefore, in practical terms, it is difficult to pursue sustainable development directly at the level at which it has been originally and theoretically defined. The difficulty is, of course, exacerbated by the multi-faceted nature of the concept. Responding to these inherent difficulties, there have been several suggestions with respect to the way sustainable development can be rendered operational. A major component of the answer to this question should be bridging the gap between the global goal and local practice towards it.

1.4. Operationalising the concept

This section introduces some of the ways that have been suggested to promote sustainable development in practice. It is important to note that the suggested ways do not offer the means towards a well-defined stable condition which they identify as sustainable. They only identify processes and mechanisms that can overcome some of the inherent difficulties of the concept, in order to propel society towards a sustainable mode of development.

As mentioned earlier in this chapter, according to the authors of the *Blueprint for a Green Economy* (Pearce et al., 1989), the most important obstacle in pursuing sustainable development is a traditional misconception of modern economics. The misconception is that further economic growth, which is essential in order to cater for the needs of the poor of the present, is contradictory to environmental protection, which is necessary in order to ensure future generations will be able to cater for their needs. A series of five *Blueprints* develops the way in which this misconception, that is emphasised by environmentalists' 'irrational preference' to environmental regulation, can be eliminated.

The problem, as identified in the first *Blueprint,* is that while man-made capital stock has a market value, natural stock, like clean air and water, although serving 'economic functions', tends to be external to the market system and, hence, free. This externalisation results in the overexploitation of the natural environment. For example, industries can discharge their polluting effluents in rivers and coasts and their toxic gases in the air free of charge. The authors of the *Blueprint* suggest that assigning monetary value to natural environmental assets will protect them from excessive use. They do not reject environmental regulation, in their terms 'command and control' measures, but maintain that 'market-based instruments', like environmental taxes, credits etc., have the potential to trigger movement on the 'sustainable development path'. In short, Pearce et al. advocate pursuing sustainable

development primarily through a shift of emphasis in economics. The practical tool for this shift is: assigning monetary value to environmental assets by adding their actual and their potential use value as well as their perceived intrinsic value. Subsequently, conventional accounting systems need to be extended to include stocks and flows of natural environmental assets. Hence, market-based environmental protection, as opposed to environmental regulation, can be practiced universally. 'Environmental pricing' is seen as a neutral instrument as it measures the environment with a commonly accepted, value-free currency, i.e. money.

Queries have been raised regarding the ethical legitimacy of reducing nature to economic capital. Surpassing ethical queries, environmental pricing is still not value-free, as it is actually based on 'arbitrary assumptions' regarding individual preferences. It is not clear exactly whose preferences are valued, or why these preferences will necessarily be favourable to the environment (see Harvey, 1996, pp150-157, Yearley, 1996, pp124-130).

Economics is used by Pearce et al. as the single rational and universally valid[11] springboard which can mobilise all processes required for operationalising a multi-faceted concept. In an effort to overcome theoretical problems and promote practice towards sustainability, the authors of the *Blueprints* reduce the concept to one only of its components assuming the 'invisible hand of the market' will trigger transformation of the rest. There is no guarantee, however, that social equity, a central component of global sustainability, will be promoted. In addition, Pearce et al. recognise no social, cultural, geographical or other variations in the problem addressed and hence suggest a universally uniform and supposedly value-free solution for both local and global unsustainability. In this case, the global nature of the concept of sustainable development is further enhanced to assume global practice towards it.

While Pearce et al. attempt to simplify the process of transforming the course of development by equating it to extending the scope of economics, Anthony M. H. Clayton and Nicholas J. Radcliffe (1996) use the very complexity of the process as their point of departure. Although they acknowledge the inevitable reductionism of all scientific models, they suggest that a 'generalist systems theory' can escape the danger

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[11] *Blueprint for a Green Economy* (Pearce et al., 1989) was mainly concerned with the environment of the United Kingdom. *Blueprint 2: Greening the World Economy* [Pearce (ed.), 1991] addressed global environmental issues, like global warming and population growth, using the same assumptions.

of 'one-dimensional mapping' and accommodate the inherently multi-faceted nature of sustainability. Clayton and Radcliffe (1996, p6) suggest that:

> ...any analysis, to be adequate, must include the relevant environmental, political, economic and socio-cultural factors. The sustainability of the human species can only be defined, ultimately, at the level of the interaction between the entire complex of human systems and all directly implicated environmental systems.

Using systems language, the authors identify the world as a set of 'complex adaptive systems'[12] and identify their components, operating processes and patterns of trans-boundary interaction. There are several very valuable observations emanating from this analysis. First, sustainability is not a stable condition but a dynamic one (Clayton and Radcliffe, 1996, p214).

> It is probably more accurate to think in terms of reducing rather than eliminating the overall risk to which the human species might be exposed, and of reducing the number of impact activities agreed to be unsustainable rather than aiming for a definable state called sustainability.

Second, interaction takes place between several incompatible subsystems and there is always a trade-off when choices regarding one subsystem are made. It is important to identify the stakes involved and the interaction between them, and balance the trade-offs. Clayton and Redcliffe acknowledge the partiality of every choice regarding complex systems and suggest internalising trade-offs and highlighting assumptions, instead of concealing them. They propose a graphic representation of such an analysis, coined Sustainability Assessment Maps (SAMs), as an instrument towards a better understanding of processes (figure 1.1.).

SAMs are not supposed to offer solutions but to illuminate the complexity of each problem, accommodate its components and map their interaction. They are, thus, expected to increase transparency and accountability of the decision-making process (Clayton and Redcliffe, 1996, p207).

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[12] Adaptive are systems that 'in some way interact with their envrironment and change in response to envrironmental change' (Clayton and Redcliff, 1996, p23).

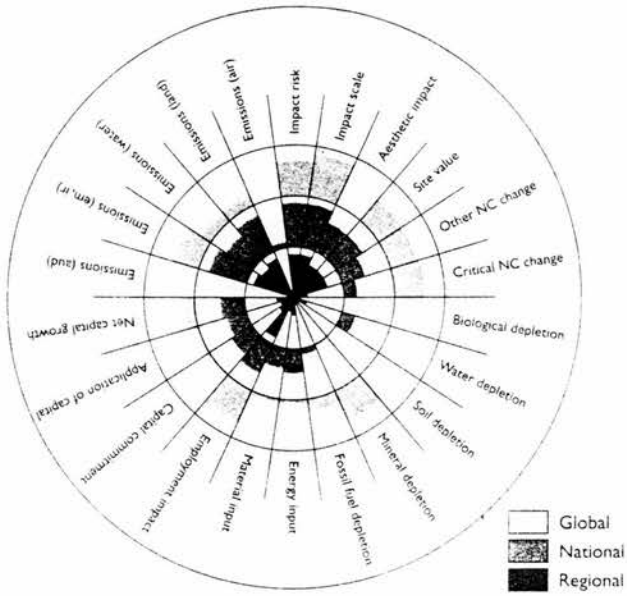

Figure 1.1. Example of a Sustainability Assessment Map (SAM) mapping the issues involved in the building of a new nuclear power station (Clayton and Radcliffe, 1996, p203).

Clayton's and Redcliffe's approach can be said to overcome some of the theoretical problems of the term sustainable development recognised earlier in this chapter. First, it can accommodate geographical, economic, cultural or other variations and, hence, does not aspire to a single, globally valid, solution but to a single way of mapping problem components. Second, it is adaptive with regard to different scales of reference; it can be applied for a local project appraisal as well for policies regarding global action. Third, it does not seek legitimation in the objectivity of science or of any other domain. In the authors' words (Clayton and Radcliffe, 1996, p212):

> It is important not to place too much reliance on system models, or economic models or any other kinds of models....The real challenge of sustainability is to move to open systems thinking - pragmatic, ethical rather than ideological, and beyond simple certainties.

Michael Carley and Ian Christie (1992) also take the complexity of the concept of sustainable development as their point of departure in order to 'manage' it. Like Clayton and Radcliffe, they draw on general systems theory to achieve a 'holistic viewpoint' and understand linkages and interactions between different components. Their approach, however, is more practice-oriented, or rather 'action-oriented'. Sustainable development is a problem of management of the variety of agents that are identified as having stakes in the process towards it. Incongruity between global

environmental concerns and the need for local action in response to them poses one organisational 'gap'. Institutional inflexibility and compartmentalisation confronted with environmental problems which are by nature dynamic and composite is another. Existing structures are incapable of bridging these 'gaps' in order to initiate and manage the process of shifting towards sustainable development. Therefore, new structures need to be devised.

With regard to the appropriate level of intervention, Carley and Christie challenge the distinction between 'top-down' and 'bottom-up' approach, between centralisation and decentralisation of management. They acknowledge the imperative to orchestrate action at all levels not only because environmental problems are thus manifest in physical terms, but also because economic, social and cultural processes are currently also multi-tier. Hence, there is not a single appropriate level of intervention for sustainable development. All levels are indispensable. In the authors' words: 'Problems may be analysed at a global or national scale, but the resolution of big problems will be the result of aggregating smaller projects' (Carley and Christie, 1992, p187).

The organisational structure suggested as appropriate to contain all the above concerns is coined 'action-centred network' and aspires to establish vertical and horizontal integration i.e. to integrate action at all levels from the global to the local as well as across disciplinary boundaries and between the private and the public sector. These networks are non-hierarchical and encourage what is, according to the authors, a crucial step toward sustainable development, namely direct public participation. Each network must be grounded on real problems which should be reassessed and redefined in the process, and act as an overarching flexible structure facilitating communication and collaboration on an equal basis between all stakeholders. The Groundwork Trusts, a network of private and public agents and community groups involved in rehabilitating derelict industrial and urban areas in the United Kingdom, are mentioned as a successful example of this integrative managerial approach to sustainable development (Carley and Christie, 1992, pp206-15).

Comparing the three approaches to operationalising sustainable development, Pearce's 'environmental economics' approach appears to be the most practical and readily applicable as it uses a well-known established language, that of free-market economics and does not require a radically new understanding of problems or the invention of new structures. The last two, however, are clearly broader in their scope and more

responsive to the multi-facetedness of the problem of unsustainability, without being impractical.

Although divergent in their priorities and methods, the ways reviewed have a common attitude with respect to how the problem of operationalising sustainable development needs to be approached. Whether it is a misconception in the field of economics, a deficiency in the way problem analysis is pursued or administrative and organisational gaps in the management structure, all approaches try to identify existing unsustainable processes and redesign them with a view to sustainability. They do not assign specific features to the sought-for condition, but try to devise mechanisms towards it. Theories aiming at operationalising sustainable development can be said to have shed light to the concept's theoretical meaning by addressing some of the term's inherent incongruities i.e. global goal-local problems, environmental protection vs. economic growth, interconnectedness of incompatible systems (environmental, social, economic, cultural).

1.4.1. Sustainability Indicators: Measuring progress

Having achieved international moral commitment to the general concept, through the signing of *Agenda 21* by over 170 national states, the next question raised is how progress towards or regression from such a global and all-encompassing goal can be measured.

The idea of sustainability indicators is acquiring momentum in this respect. Many agents, notably international organisations like the United Nations, national governments and local authorities are producing their lists of Sustainability Indicators.

The idea of using a measurement of a specific component of a system, as a way to acquire information with regard to the condition of the whole system is obviously not new. The most widely used indicator of a country's well-being is still the country's Gross Domestic Product (GDP), which is, in effect, an indicator of its formal economic activity. It has been widely criticised not only for equating economic growth to human welfare but also for being inappropriate and incomprehensive even when measuring economic growth itself[13]. It is also blamed for not accounting for the loss and degradation of a nation's natural environment. Moreover, indicators

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[13] For example, Daly criticises the fact that in GDP calculation, expenditures that are directed towards curing unwanted effects of production are added as positive. 'We count the real costs as benefits - this is hyper-growthmania' (Daly, 1973, p150). See also (Pearce et al., 1989).

measuring environmental trends, already widely used at the urban and national level, are confined in their scientific boundaries, and are also under criticism for being ambiguous and not genuinely informative.

A precursor of Sustainability Indicators is the *Human Development Index* (HDI) developed by the *United Nations Programme for Development* with a view to challenging the, traditionally perceived as automatic, link between economic growth and human progress and constructing a more inclusive indicator of human welfare of a country than the GDP (UNDP, 1990). HDI takes into account levels of literacy, life expectancy and purchasing capacity of income per capita of each country. Starting in 1990, the UNDP produces an annual *Human Development Report* in which most countries of the world are ranked according to their HDI. The same reports list a number of *Human Development Indicators* regarding economic and social welfare and stocks and flows of natural resources.

Taking the idea of interdisciplinary indicators further, lists of Sustainability Indicators are currently being produced mainly for three levels of reference: the urban, the national and the global. Their function is twofold. First, they are intended to measure environmental, economic and social trends that have been identified as indicative of sustainability for a city, a nation, or the world. Second, they seek to inform the process of shifting towards sustainable development by offering constant feedback to introduced measures and policies. The latter function is, arguably, the most important and instrumental, given the vagueness and ambiguity surrounding the practical aspect of sustainability. Measuring sustainability may function as a thrust to the process of pursuing it. However, to realise this potential some weaknesses of current Sustainability Indicators need to be overcome.

The first weakness stems from the immaturity of the discourse of sustainable development itself. The state of the discourse in the end of the 1990s may be compared to the state of the natural sciences before Newton when, as Thomas Kuhn describes, 'in the absence of a paradigm or some candidate for paradigm, all of the facts that could possibly pertain to the development of a given science are likely to seem equally relevant' (Kuhn, 1970, p15). In a similar vein, there is not a 'paradigm' of practice towards sustainable development and hence the variables which, when measured, are likely to give an indication of progress towards it are not evident.

The second weakness stems from the globality of the notion of sustainable development as it has been discussed earlier. International bodies such as the United Nations, the OECD, or the European Union suggest their lists of Sustainability Indicators not only referring to the world or their region of reference but also referring to the city. This assumes that drives of unsustainable development of nations, regions and cities around the world differ in degree only and not in kind. It also assumes that a state of sustainability features the same attributes irrespective of geographic, social, economic and cultural differences. Therefore, it is possible to devise a list of Sustainability Indicators that is informative of every nation's or every city's progress. It is a central point of this thesis that the above assumptions are not valid and that, notwithstanding its global nature, the constituents of sustainable development vary considerably across the world.

Furthermore, as seen from Clayton's and Radcliffe's 'systems approach', sustainability is not a static but a dynamic condition and, therefore, Sustainability Indicators cannot be a fixed list against which nations or cities can test their progress, but need to be flexible and changing. In addition, to being responsive to place, as the last paragraph implied, they need to be responsive to time.

Finally, Sustainability Indicators, in order to fulfil their role, should be effectively linked to the decision-making process so that they can directly inform and influence it. If such links are not forged Sustainability Indicators can be reduced to mere collection of statistical data. The role of Sustainability Indicators will be further discussed in the context of urban sustainability.

Measuring sustainability is currently seen by international and local institutional bodies as a practical means towards attaining it. Sustainability indicators, however, need to develop certain dimensions in order to fulfil their potentially instrumental role. Namely:

- the accuracy of its indicative character
- its responsiveness to place
- its responsiveness to time
- its effective links to the decision making process.

1.5. Concluding Remarks

This chapter attempted to identify the meaning of the term sustainable development as it is understood in official international documents and relevant publications.

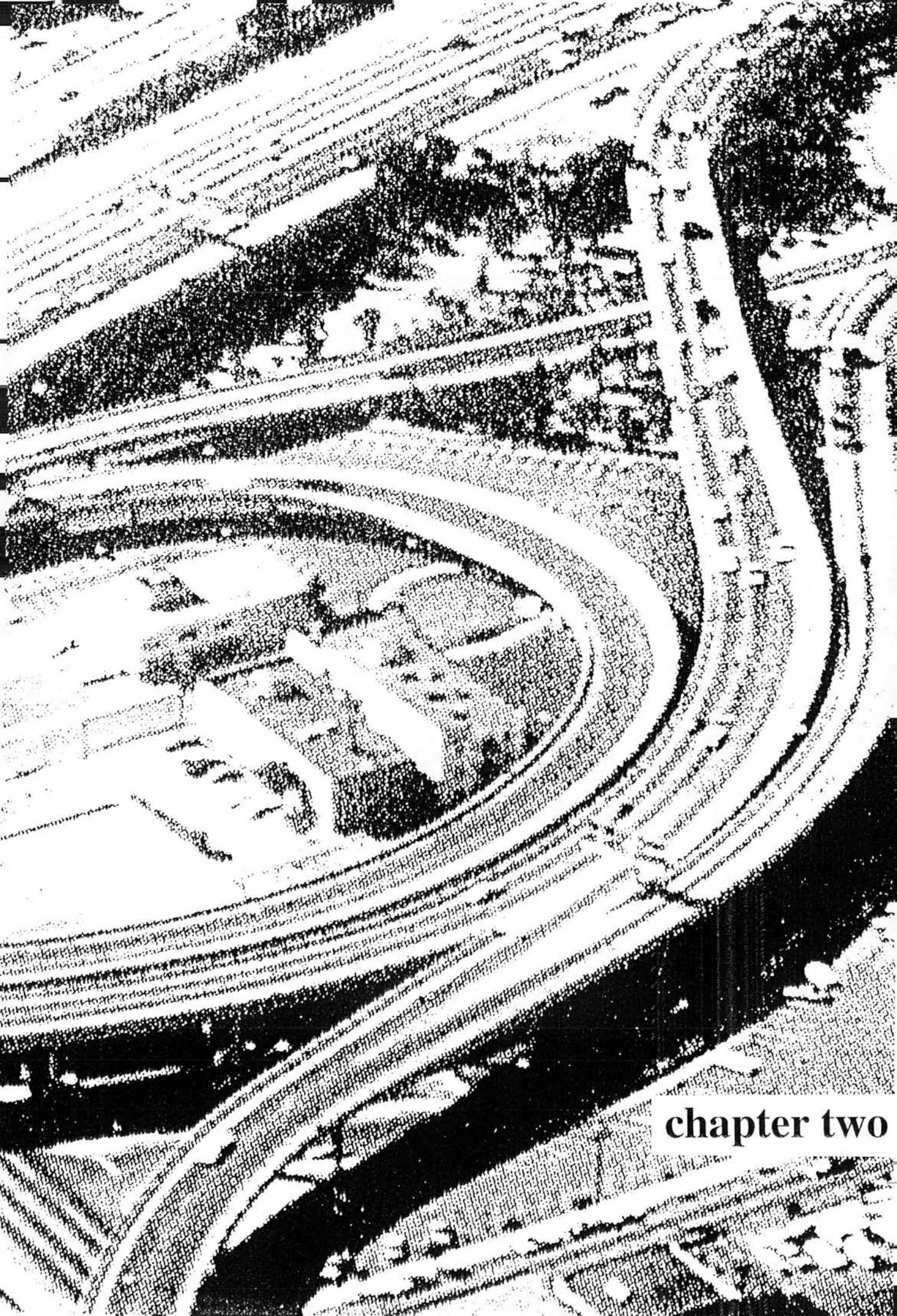
Although the sustainable development discourse is relatively new - its opening is symbolised by the publication of the Brundtland Report in 1987 - its principle tenets can be identified in the previous upsurge of environmentalism in the early 1970s. Certain common themes are identified, between early visions of sustainability and its official international pursuit. There are, however, some qualitative differences, too.

Globality has been a definitive feature of the concept of sustainability since its early expressions. It is argued that, the inherent global nature of the term is, on the one hand, to an extent, constructed and, on the other, opposed to the concept's practical pursuit. Set in the background of today's multiplicity and heterogeneity of discourses, the goal of sustainable development aspires to offer an overarching and unifying goal, legitimated by an outdated belief in the objectivity of science and depending on an assumed globality of problems and human identity.

Ways suggested towards operationalising the concept are presented with a view to improving understanding of its meaning. Sustainability is a multi-faceted and dynamic state. Practice towards it should acknowledge the complexity and interdependence of the issues involved and start by addressing unsustainable processes rather than by determining the sought-for constituents of sustainability. Creating appropriate institutional and organisational structures to bridge the 'gaps' between the several levels and the different incompatible systems in which intervention is required is a crucial step on the right 'development path'. Therefore, operationalising the concept of sustainable development requires amending currently unsustainable features of operational processes, rather than constructing visionary proposals about its materialisation.

Sustainability indicators are promoted in the discourse as a means, not only to measure progress towards sustainable development but also to propel its practical pursuit. The last section of this chapter identifies certain dimensions of the current use of this means that need to be developed in order to fulfil its potential.

The concept of sustainable development and its problems of applicability created the *rationale* for the emergence of the discourse on sustainable cities. The concept's theoretical problems, as identified in this chapter, become more evident when they are transformed into palpable solutions for the burgeoning problems of the world's cities. Chapter 2 identifies the conceptual framework of the sustainable cities discourse on the intersection of developments in environmentalism and urban planning.



chapter two

CHAPTER 2

A NEW CONCEPTUAL FRAMEWORK FOR THE CITY

2.1. Introduction

This chapter presents the conceptual framework in which the expanding discourse on sustainable cities has developed, and identifies its intellectual origins. Although urban sustainability is a social and economic goal, apart from a strictly environmental one, the reconciliation of the relationship between city and nature has become the most central theme of the discourse. This chapter traces the ways this relationship has been perceived and materialised in pre-industrial settlements, in the theory and practice of orthodox modern planning, in the postmodern reactions to it, in early environmentalism and, finally, in the current discourse of urban sustainability. The breeding ground of the current discourse is identified at the intersection of two domains, namely environmentalism and urban planning. It is argued that transformations in the prevailing ideologies of both domains have led to the formation of the concept of urban sustainability.

After highlighting the definitive themes of the new conceptual framework for the city, this chapter identifies a number of recurring themes in the different expressions of the urban sustainability discourse. Within this conceptual framework, all physical and non-physical urban processes are reinterpreted. Crucial links between processes operating in the city, so far obscured by administrative and disciplinary divisions, are illuminated. Finally, links between urban and global processes are acknowledged.

Notwithstanding the comprehensive nature of urban sustainability, the issues that have gained prominence in the discourse are those stemming from employing the metaphor of the city as an ecosystem or an organism, set in its natural context and ultimately the biosphere. It becomes clear that the discourse is an outcome of, and a response to, the wider discourse on sustainable development and that it shares the global nature of that concept both in its theoretical pursuits and in its practice.

The next chapter will draw emphasis on the way physical urban form is approached within the new conceptual framework for the study and management of cities.

2.2. Sustainable Cities: Oxymoron or Opportunity

2.2.1. The City and Nature in History

The central hypothesis of the discourse of urban sustainability is that the way cities operate and develop at present threatens, on the one hand, the sustainability of cities themselves by degrading the urban environment in physical and social terms and, on the other hand, the sustainability of the global ecosystem by posing a major burden of pollution and waste on it and by devouring huge quantities of its natural resources. Therefore, the relationship of the city with nature, the immediate natural environment and the earth as a whole, is presented in the discourse as demanding redefinition.

Looking at this relationship in a historical perspective, it is possible to trace the transformations it has gone through since the emergence of the first urban settlements, about 6,000 years ago. According to most accounts of urban history, a prerequisite for the emergence of the first urban settlements has been the development of settled agriculture through the domestication of certain animals and grains, and the subsequent production of food surpluses (see Mumford, 1961, pp21-39, Ponting, 1992, pp37-67, Morris, 1994, pp4-7)[1]. This meant that not everybody had to cultivate the land for subsistence and gave rise to division of labour and exchange of services and products. People practising crafts or offering services of religious, mercantile or military nature were not obliged to reside in farmed land and hence, gathered gradually together forming settlements of high densities. In those settlements, exchange of products and services was facilitated and defence from external enemies was easier.

The physical form and operation of cities, from the advent of urbanisation until the Industrial Revolution, was responsive to, not exclusively determined by, the natural exigencies of their site, the climate and the locally available materials[2]. Even when abstract geometrical principles, like the gridiron Hippodamean plan, were dictating the

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[1] The opposite view, regarding the first occurrence of urban settlements, has also been expressed. See Jacobs (1969, pp13-54), Bookchin (1995, pp27-32). They both advocate that cities preceded settled agriculture and support their view drawing evidence from archaeological findings of the cities of Catal Huyuk in Anatolia and Jericho in Jordan. These were built 9,000 years ago, i.e. three millennia earlier than cities in Mesopotamia, for religious reasons and their inhabitants 'acquired much, perhaps most, of their food from hunting of game and the harvesting of undomesticated plants' rather than from agriculture (Bookchin, 1995, p29). However, it is debated whether Catal Huyuk and Jericho had developed an 'urban civilisation' or they were just 'overgrown peasant villages' (Morris, 1994, p20).

[2] Urban form was not exclusively dictated by 'natural determinants' but also by 'man-made determinants', i.e. political and religious power, defence, economy etc. For a detailed account of 'urban form determinants' in pre-industrial settlements, see (Morris, 1994).

form of planned cities, natural factors were determining their location and often modifying the preconceived visions of their form[3].

In order to function and be sustained, pre-industrial cities were dependent on limited hinterlands of agricultural and forest land for food, energy and materials. The size of the hinterland varied for each city and depended on the technological advancement of the urban society, its political power as well as the nature of the surrounding land, i.e. whether a valley or a mountainous area, whether adjacent to a river or not, etc. [Stren et al. (eds), 1992, p11]. The pre-industrial city not only received resources from the surrounding nature but also returned some useful resources back to it. Therefore, the relationship of the city with its hinterland was 'symbiotic', rather that 'parasitic'. One of the vital operating processes of the free cities of Medieval Europe, namely the way they disposed their organic wastes, exemplifies this 'symbiosis'. Farmers and market gardeners of the surrounding countryside were systematically collecting these urban by-products in order to use them as fertilisers for their agricultural land and gardens (Mumford, 1961, p290). White and Whitney call the urbanisation that preceded the Industrial Revolution 'quasi-sustainable' because, although in ecological terms it exhibited a benign relationship with nature, in social terms it featured inequalities especially between urban and rural populations [Stren et al. (eds), 1992, p20].

Notwithstanding the original reciprocity between cities and their surrounding nature, examples of urban unsustainability can be drawn from cities as ancient as those of the Sumerian civilisation, that flourished between the fourth and third Millennium BC. Clive Ponting attributes the decline and demise of those early urban environments, like Ur, Kish and Uruk, to the pressure they put on their surrounding land for food and resources and their failure to manage it properly. Thus, they caused deforestation, soil erosion and soil salination of their hinterlands and the subsistence of the cities themselves was challenged. Similar effects of urbanisation on nature are recorded in the ancient cities of the Indus valley, of China and of Greece (Ponting, 1992, pp68-87). Rome is the city which, like contemporary metropolises, extended its environmental impacts to places out of its surrounding hinterland to cover the needs of its population for grain and materials. It is, hence, blamed for extensive deforestation

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[3] Olynthus, the 5th Century BC city of Northern Greece, is a good example of a sophisticated reconciliation between geometrical vision and response to natural forces. Built on a gridiron plan, the houses of Olynthus were organised in blocks of ten, following the East-West axis to take maximum advantage of the sun. Each dwelling was developed around a south-facing courtyard which allowed winter sun to enter the interior, while offering protection from unwanted summer sun. Arrangements in the plan of each house ensured that the courtyard always faced south, whereas the house front could be either south or north facing (Knowles, 1981, pp36-37).

and soil erosion in the North African provinces of the Roman Empire (Girardet, 1992, pp42-43, Ponting, 1992, p77).

Industrialisation and the concomitant intense urbanisation of West Europe during the late-18th and 19th centuries, developments in transport technology and expansion of colonial control resulted in a new relationship of cities with nature. This relationship was different from the pre-industrial one in two respects. First, cities' development and operation had intensified effects on nature due to increase of urban populations and of the use of energy for industry and transport. Second, those effects were not limited in the surrounding hinterland of each city but were degrading environments and depleting natural resources in distant lands, often subject to colonial control [Stren et al. (eds), 1992, pp20-26]. Cities' 'ecological footprint' was enlarged (Rees and Wackernagel, 1996).

In the end of the 20th century, almost half of the world's five billion people live in cities. Although urban population has stabilised in the developed world, urbanisation is continuing in countries of the developing world. The 'parasitic' relationship of the city with nature, initiated by the Industrial Revolution, is at present further intensified rather than resolved. Notwithstanding the end of colonialism, urban hinterlands are currently spanning the globe because of the global operation of the economy and of increased demands in materials, energy and food. Cities, particularly those in the developed world, produce increasing amounts of waste that is affecting distant environments as well as the balance of the biosphere as a whole. Transfer of hazardous waste, across several countries, typically from rich to poor ones with lax environmental policy, is an example of the former. CO_2 emissions are an example of the latter.

A definitive theme of the discourse on sustainable cities is the reconciliation of the relationship between city and nature; the establishment of a 'symbiotic', rather than the present 'parasitic' relationship. The next section argues that, along with developments in technology and the global economy, the indifference of contemporary city towards its natural context has also been supported by the planning ideology prevailing from the advent of modern planning until the end of the 1960s. Orthodox modern planning sought for the 'functional city' as the outcome of the 'rational plan', generated by universal optimal standards and not responsive to geographically-specific natural processes. Within this planning ideology 'a sustainable city', responsive to local and global natural processes, would be an oxymoron.

2.2.2. The City and Nature in Urban Planning

Within the recent history urban planning, it is possible to trace a gradual transformation both in the way the relationship between the city and nature is perceived and in the way the nature of the city itself is perceived.

Principles of orthodox modern planning concentrated on abstract notions of efficiency and hygiene pleading universal validity of a quasi-scientific nature[4]. As yet another expression of the 'modern project', modern planning sought to liberate man from his dependence on nature, as well as from traditional constraints, employing the universal truths of science and the possibilities opened by its technological applications. Le Corbusier, arguably the most influential figure of post-war planning, forwarded his book *City of Tomorrow*, with the following statement (1971, p1):

> A city! It is the grip of man upon nature. It is a human operation directed against nature, a human organism both for protection and for work. It is a creation.

In this book, which contained his vision for the virtual elimination of the historic fabric of Paris, he aspired 'to arrive at the fundamental principles of modern town planning'. Geometry and repetition[5], separation of different uses, different social classes and different kinds of automobile traffic are some of the principles advocated by Le Corbusier. His idea of nature is an ideally flat site on which the gridiron plan can be imposed, leaving quantifiable amounts of green, fresh air and sunlight between the repeated identical blocks. Le Corbusier writes about his plan for Paris:

> The traveller in his airplane, arriving from Constantinople or Peking it may be, suddenly sees appearing through the wavering lines of rivers and patches of forests that clear imprint which marks a city which has grown in accordance with the spirit of man: the mark of the human brain at work.

Le Corbusier's plans for new cities or extensions of existing ones, although implemented limitedly, have been extremely influential in the planning of cities world-wide. They are typically abstract visions, ignorant of any local particularity, be it history, culture, social structure or natural exigencies. Accommodation of the speed of the automobile was maybe their most central intention. Le Corbusier's only

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[4] For accounts of the theory and practice of modern urban planning see Hall, 1988, Benevolo, 1971 and 1982, Frampton, 1985 etc.

[5] Le Corbusier wrote: 'The city of today is a dying thing because it is not geometrical....The result of a true geometrical lay-out is repetition. The result of repetition is a standard, the perfect form.' (1971, p171).

executed urban plan, Chandigarh, the capital of Punjab and Haryana States in India, is a testimony to the lack of responsiveness to specific physical and non-physical circumstances.

The visions of Le Corbusier took for granted abundant supplies of energy for travelling between the segregated functional zones and for operating the residential towers whose architecture was ignorant of climatic considerations[6]. Dependence on energy is even more noticeable in the vision for the future of the city suggested by Frank Lloyd Wright in 1932. His Broadacre City, consisting of detached houses built on one-acre plots spread on the countryside and serviced by networks of celebrated 'giant roads', would require long distance travelling by automobile to reach all facilities [Blowers et al. (eds), 1974, p43].

During the 1960s, modern architects and planners exaggerated the conceptual detachment of the modern city from its physical constraints by trying to liberate it from its dependence on a single geographical location. Futuristic utopias like the Walking city and the Plug-in city (Cook, 1967) are expressions of the modern belief in the limitless possibilities of technology and its liberating power. Taken to the extreme, the abstractness of modern planning challenges the very physicality of the city and approaches it as the 'non-place urban realm' and 'a processual system' with no dependence on physical proximity (Weber, 1969, pp79-147). Although, very different in terms of physical form, all modern visions for the city mentioned above were envisaging new spatial forms to contain modern life, validated by their scientific or high technological character.

Criticism of Modernist architecture and planning started in the late 1960s and took many forms[7]. Many a critic highlighted the exclusive and elitist nature of modern principles and the aesthetic rigidity and social dysfunction of their physical manifestations. Several factors that have been marginalised or ignored by modern planners, were brought to the foreground of planning theory and practice. For example, differences in spatial perceptions, behavioural patterns and needs among different cultures, across genders and between different social groups, the role of

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6 Rayner Banham (1969) in his *Architecture of the Well-Tempered Environment* celebrates the moment air-conditioning was invented and architecture was freed from climatic considerations. Mechanical, energy-operated devices could condition buildings' interiors more efficiently than heavy masonry and appropriately oriented openings. Banham's view exemplifies the attitude of many orthodox modern architects towards natural processes.

7 See, for example, Venturi, 1966, Rossi, 1966, Alexander, 1972, Blake, 1974, etc.

history as a space-shaping factor, the value of participation of the user as opposed to the authority of the expert have been among the reinvented themes of, what Nan Ellin (1996) calls, 'postmodern urbanism'. There is an ongoing debate regarding whether the above developments and equivalent developments in the arts and philosophy represent a new condition of knowledge, dubbed postmodernity, or are expressions of the 'unfinished project' of modernity itself (Habermas, 1985). Giddens (1990) argues for the latter, interpreting current developments as expressions of the 'reflexive' nature of modernity. Lyotard (1984) argues they represent the emergence of a new condition. In any case, the above developments in urban planning do not constitute a concrete body of theory or practice with regard to cities. They share a distrust of the principles of orthodox modern planning and the vision to create a more humane and 'imageable' urban environment. Nature is one of the factors that was reintroduced in urban planning as a result of this wide criticism of orthodox modernism.

McHarg (1969), landscape architect and planner, has been one of the first to highlight the fallacy of the detachment of orthodox modern planning from natural processes. Drawing from a tradition originating from Patrick Geddes and continued by Lewis Mumford, McHarg suggested a new framework for urban planning, coined 'physiographic determinism', based on a detailed analysis of local natural processes rather than on preconceived and supposedly universal rules. The ecological features of the city's region, i.e. vegetation, hydrology, geology, wildlife etc,. along with those that are human-induced, like historic value, market values etc., form the constraints as well as the opportunities for urban growth. Emphasis is placed on land-use planning and especially on the location and urban function of open spaces.

McHarg has been among the most important proponents of what came to be known as Environmental Planning. Michael Hough and Ian Douglas can be mentioned as his disciples. Hough (1984), in the spirit of McHarg, suggests identification of natural processes as a planning tool and draws emphasis on the form, design and urban function of green spaces. He suggests transforming their role from being strictly decorative, recreational and energy-dependent environments to becoming productive, self-sustained, climate-improving and educational. He extends the scope of McHarg's framework from the level of planning to the level of urban design. Hence, natural processes are not employed only to direct development at the level of land-use planning, but also to dictate physical form and regulate urban operational processes such as sewage, water drainage, waste management and urban microclimate.

In a similar vein, Douglas (1983) stresses the importance of a 'bio-socio-physical approach' to cities and employs the metaphors of the city as an ecosystem, which will be discussed later in this section, and as an economic system. Finally, Knowles's *Ecological Approach to Urban Growth* (1974) can also be mentioned as continuing and elaborating on McHarg's *rationale*. Knowles's focus, however, is on one natural cycle only: the movement of the sun during the day and the year. Using this as his point of departure, he produces a planning tool which instructs urban form from the level of the region to that of the individual building (see Chapter 4, section 4.2.1.).

The sustainable cities discourse also adopts a critical stance towards orthodox modern urban planning and can be said to continue the legacy of the above responses to its exclusive and universalistic nature. The discourse seeks to position the city in its natural context in order, on the one hand, to expose the effects it has on the immediate and the global ecosystem, and on the other, to redesign urban form and operation respecting this context. Ideas bred within the discourse, like the city operating within 'environmental space' or 'carrying capacity'[8] or reducing the city's 'ecological footprint'[9], intend to relate urban operation to the ecological characteristics of the region and the biosphere. The contribution of the city on global and regional environmental problems like CO_2 and on acid rain respectively, is acknowledged in this respect.

Along with the criticism of modern urban planners' ignorance of nature, questions were raised regarding the nature of the city itself. Is the city a natural or a man-made formation, an ecosystem or a machine? This theme also developed as a reaction to the mechanistic view of the city held by modern planning. Large scale rational planning of the 'functional city' employed segregation of land uses, repetition of optimised housing units, quantifiable amounts of green and social amenities aiming at maximising efficiency. The appropriate metaphor for the 'functional city' of the 'machine age' was that of the machine (Lynch, 1981). Principles emanating from this metaphor were advocated by the masters of the Modern Movement - Gropius, Le Corbusier, etc. - and influenced significantly the practice of post-war urban planning in many countries in the world.

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[8] "Ecologists can define 'carrying capacity' as the population of a given species that can be supported indefinitely in a given habitat without permanently damaging the ecosystem upon which it depends. For human beings, carrying capacity can be interpreted as the maximum rate of resource consumption and waste discharge that can be sustained indefinitely in a given region without progressively impairing the functional integrity and productivity of relevant ecosystems" (Rees, 1992, p125).

[9] A city's 'ecological footprint' is the aggregate land area required to support its population in terms of food, fuel, waste-processing capacity etc. (Rees, 1992, p125).

Among the earliest critiques of orthodox modern planning is Jane Jacob's *The Death and Life of Great American Cities*, published in 1962. Jacobs challenges the validity of the principle tenets and practices of modern planning e.g. that segregation of land uses is conducive to a more efficient environment or that extensive green spaces are necessarily a positive feature of the city, etc. Subsequently, she offers an explanation for the widely acknowledged failure of modern planners to create livable environments. The root of the problem, Jacobs maintains, lies on an enduring misconception regarding the nature of the city itself. All modern planners, from the very first ones of the late 19th Century to those of the early 1960s, have treated the city as a problem of two variables, like most of the problems of classic physics, or as a problem of disorganised complexity effectively solved by statistics and probability theory. Conversely, Jacobs suggests, the city is a problem of organised complexity analogous to the problems faced by the life sciences such as biology and medicine. Every element of the city is directly affected by a large number of other elements which, in turn are also determined by other interrelated elements. There is nothing irrational in this network of relationships. They need to be carefully examined as real facts and not as abstract statistical data in order to be understood and predicted (Jacobs, 1962, pp443-448). In effect, Jacobs employs the metaphor of the city as a biological organism as opposed to the modern metaphor of the machine.

A few years later in 1968, Constantinos Doxiadis shared with Jacobs the reference to biology in order to study human settlements (Doxiadis, 1968, pp41-43). Drawing from the theory of evolution, Doxiadis argues that human settlements are indubitably organic formations on the basis that three out of their five components - Nature, Man, Society, Shells and Networks - belong to the organic world. He does not identify human settlements with a biological unit of any existing category. Instead, he suggests they constitute the youngest and most complex product of biological evolution, not yet developed in perfection. Human settlements are biological individuals of the third order - cells being of the first and organisms of the second. Doxiadis distinguishes settlements from organisms on the basis that the former, in contrast to the latter, are products of conscious human thought rather than of unconscious natural processes. Inasmuch as this basic difference is understood, Doxiadis finds the metaphor of settlements as organisms useful for their understanding.

Other organic interpretations of the city, however, viewed the city as an organism in more physical terms. Davis identifies in the city, just like in all living bodies, a structure (anatomy) and an operation (physiology); the latter being the interchange between different parts and functions of the city and the former the spatial pattern of those parts and functions (Davis, 1973, pp181-5, cited in Douglas, 1983). Other similarities between the city and an organism, employed to support the analogy, are the facts that the city consumes energy and materials from its extended environment and excretes wastes, it changes its tissue with time, it consists of different parts, that could be described as cells, and interact with each other through structural walls and divisions, that could be paralleled to organic membranes. Douglas, however, suggests two factors that challenge the validity of the organism metaphor. The first, close to the basic difference suggested by Doxiadis, is that the city can consciously change its structure through planning following economic, political and social forces. The second difference is that the various parts of the city differ so much in size and function from one another that the analogy of them being organic cells does not offer much to their understanding (Douglas, 1983, p11).

Another view of the city borrowing from a branch of biology, namely ecology, is that which describes it as an ecosystem. Ecosystem is one of the divisions of the biosphere that the science of ecology employs in order to delineate areas of study of the interaction of organisms with their natural environment; other smaller divisions being communities, populations and organisms. According to T.J. King (1980, p100), 'an ecosystem is a community of organisms, interacting with one another and their inanimate environment (e.g. climate, soil) to form a *more or less* balanced, self-sufficient unit with its own characteristic pattern of energy flow and nutrient cycling.' These last two processes, energy flow and nutrient cycling, are common in all ecosystems of the biosphere, regardless their size and structure. As they can also be identified in the operation of the city, they have become the ground on which the description of the city as an ecosystem has been legitimised. In an energy-based classification of ecosystems, Odum (1975, pp15-21) classifies cities as *fuel-powered* ecosystems, referring to the total replacement of solar energy, which powers other ecosystems, by imported fuel energy[10].

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[10] The validity and instrumentality of the ecosystem metaphor for the city has been debated. Criticism of its use is grounded mostly on the city's lack of self-sufficiency. Responding to this argument, Boyden et al. maintain that natural ecosystems are not necessarily closed systems either, as they also interact with their surrounding environment (Boyden et al., 1981).

A study of Hong Kong, carried out in the late 1970s by a group of scientists from The Australian National University, uses the metaphor of the ecosystem as an effective tool of urban analysis (Boyden et al., 1981). All the ecological processes operating in the city are traced in detail, providing information on the patterns of energy and material flows and their impact on the urban and the surrounding environment as well as on the quality of life of the city's inhabitants. The term ecosystem is modified for the purposes of that study in order to include factors emanating from 'human culture'. Hence, the city's history, the culture of its people, its social structure and economics are studied as factors constantly interacting with physical processes and completing the 'total environment' of Hong Kong. Subsequently, Boyden et al. evaluate the quality of 'human experience' within this framework testing it against a checklist of quantifiable and unquantifiable variables. The imperative to realise the significance of interrelations and interdependencies between all urban issues at all levels and create a 'comprehensive and integrative' image of Hong Kong is prevailing throughout this work. In effect, this has been the reason of employing all organic metaphors - ecosystem, living organism or 'biological individual of the third order' - for the description of the city: to establish the study and, hence, the planning and management of the city as an integrated whole of biological unity.

In 1965, Abel Wolman introduced the term 'urban metabolism' to describe the vital physical processes of a city, namely water supply, disposal of sewage and energy use (Wolman, 1965, cited in Boyden et al., 1981).

Within the sustainable cities discourse, biological metaphors are widely used to describe the city as well as to indicate solutions to its problems. Indeed, emulating the operational processes of a natural ecosystem is often suggested as the guiding principle towards urban sustainability (Girardet, 1992, White, 1994). Rees (1992, p121) even suggests that 'human bio-ecology may soon become more important to understanding the political and socio-economic implications of urban development than economics'. The organism metaphor has been employed to describe all inputs to, and outputs of, the urban system (Girardet, 1992, White, 1994). The metabolism of contemporary cities, Girardet argues, is linear i.e. the urban organism devours materials and energy and excretes increasing amounts of polluting waste. In his *New Directions for Sustainable Urban Living*, he suggests that it is vital that 'urban metabolism' is transformed to follow a circular pattern, whereby outputs return to the city as inputs, evoking the cyclical operation of natural processes (Girardet, 1992, pp20-23).

To conclude, although the concept of urban sustainability in its full current meaning is recent, its core theme of establishing a reciprocal relationship between city and nature, has been developing since the early 1960s, i.e. since the tenets of orthodox modernism in urban planning became discredited. The same is true of the quest for an integrating and comprehensive study of all urban issues, which is central in the current discourse on urban sustainability. More recent developments in environmental discourse have offered the city its global role and have turned it into an opportunity towards sustainable development.

2.2.3. Environmentalism and the City

Chapter 1 identified a shift both in the ideological principles and the practical pursuits of environmentalism; from idealism and the anti-growth visions of 'bottom-up' social reform prevailing in the early 1970s to pragmatism and the 'top-down' official pursuit of the global goal of sustainable development in the late 1990s. This section identifies an equivalent shift in the perception of the role of the city within the framework of environmentalism.

Late-19th-century environmentalists in the United States of America praised the value of nature untouched by human intervention, assigning to it a sacred character, in contrast to the squalid profanity of the early industrial city. Thoreau, Muir, Emerson and others proposed life in absolute wilderness as having spiritually fulfilling and liberating effects on humans, whereas they deplored the crowded and polluted urban environment as unhealthy and alienating. Those early environmentalists, often referred to as 'transcendentalists' (O'Riordan, 1976, p3, Pepper, 1984, pp81-86) were advocating protection of wild, uncultivated land for its intrinsic value, and not for its utilitarian value for humans. They can be seen as the precursors of today's 'deep ecologists' (Naess, 1989).

In the same period, similar anti-urban trends were present in Europe and formed part of a wider reaction against modern industrial life. Many utopias were pronounced as alternatives to the evils of the 19th-century industrial city, a classic description of which is Coketown in Dickens's*Hard Times*. The pronouncers of such utopias were socialist and anarchist thinkers, like Robert Owen, Charles Fourier, Peter Kropotkin and others (Benevolo, 1982, pp39-84), who advocated decentralisation and co-operative community life, a combination of urban and country life, and integration of industry and agriculture. The real quest was for radical social reform reacting against

the established capitalist order. Small, harmonious, self-sufficient communities were seen as the elementary units of change. Global environmental concern was not yet on the scene, except for Malthus's (1798) early warnings regarding future insufficiency of natural resources. There was, however, already a growing disenchantment with urban life which, along with an increasing awareness of social inequalities, encouraged the proliferation of such anti-urban utopias.

In 1898, Ebenezer Howard, with his suggested network of Garden Cities, each one home to a maximum population of 30,000, expressed in spatial terms the anarchist and socialist ideals of his time. His alternative to the unhealthy congested industrial city marked the beginning of modern town planning. Howard, a social reformer rather than a physical planner himself, envisaged for the Garden City co-operative ownership of the land, participatory administration and self-sufficiency in terms of food and industrial goods (Hall, 1994, pp87-94). He, along with the other decentralists of mid-19th Century, may be seen as a precursor of the small self-governed and self-sufficient communities envisaged by the environmentalists of the 1970s.

Environmentalists of the early 1970s perceived the city, and more specifically the growing metropolis, as a major cause of environmental degradation and in many cases called for its elimination. The authors of the *Blueprint for Survival* (Goldsmith et al., 1972) whose view of the environmental crisis has been discussed in Chapter 1, have been among the most influential pronouncers of the anti-urban stance of early environmentalism. Their alternative to urban life is a 'diversified urban-rural mix' that should be supported by equivalent transformations in the way agriculture and industry operate. Thus, small communities can grow their food locally in small, ecologically sound farms, instead of receiving it from distant industrial monocultures dependent on chemical fertilisers. Industry will be a part of the community, offering jobs to local people and responding to their real needs, rather than to abstract economic data. The environmental impact of such communities, the authors of the *Blueprint* argue, will be minimal. Firstly, as goods and jobs will be provided locally, the need for transportation will be minimised, and so will levels of pollution and the need for road infrastructure. Second, domestic waste will be used as fertiliser on the adjacent agricultural land, instead of being discharged in surface watercourses. In this way, nutrients contained in organic waste will not be wasted, water pollution will be reduced and agricultural production will be less dependent on chemicals.

Notwithstanding environmental benefits, the propagated small settlements will practise direct participation of individuals in decision-making, avoiding the bureaucracy induced by centralised administration, and will enjoy a sense of community and human contact which is unattainable in large cities. With regard to the optimum size of such settlements, the authors of the *Blueprint* suggest (Goldsmith et al., 1972, p65):

> We have no hard and fast views on the size of the proposed communities, but for the moment we suggest neighbourhoods of 500, represented in communities of 5,000, in regions of 500,000, represented nationally, which in turn as today should be represented globally. We emphasise that our goal should be to create community feeling and global awareness, rather than dangerous and sterile compromise which is nationalism.

Schumacher shares with the authors of the *Blueprint* their disillusionment with cities. In his view, a city exceeding the 'upper limit' of 500,000 people is experiencing a 'pathological growth' and has nothing to gain from this but enormous problems. Accumulation of wealth and the corollary potential for research on higher technology are the only possible benefits of a 'megalopolis'. Yet, the contribution of these benefits to the improvement of people's lives is doubted by Schumacher (1973, pp60-62).

The hippie movement of the mid-sixties, rebelling against technocracy and promoting communal life in tune with nature, contained the seeds of the self-sufficient utopias of the seventies. According to Bookchin, the hippie culture has practised the true urban life of the Greek *polis,* and, although lacking theoretical articulation, contained a much more perceptive proposal for social change and natural protection than the urban planners of the same period. Bookchin is another wholehearted advocate of decentralisation and 'bottom-up' action, rooted in the anarchist tradition and more specifically in Kropotkin's visions. He first pronounced his views on cities in *The Limits of the City* (1973) and elaborated on them in all his following books until his most recent *From urbanisation to cities* (1996). Bookchin maintains that the definitive element of a city, namely participation in community life, has been eroded in the modern metropolis, because of its size and structure. Therefore, the unsound and socially alienating metropolis should be eliminated and small settlements, operating in tune with natural ecosystems and enabling community life, should be created instead.

Despite their advocates' visions for social equity and participatory governance, the small communities suggested by environmentalists in the 1970s have been criticised as retreats for wealthy naturalists who could afford to escape the urban squalor, rather

than genuine initiatives for social reform or environmental protection (O'Riordan, 1976, pp9-11). Besides, their utopian and apolitical character prevented them from having any serious effect in reversing continuing urbanisation[11].

Contemporary to those visions, and enforcing their anti-urban *rationale*, was the emergence of the futuristic idea that telecommunication technology would gradually eliminate dependence of businesses and other activities on physical proximity (Weber, 1969, pp79-149) and lead to an 'urban civilisation without cities' (Berry, 1973, p54). According to such prophecies, global networks of telecommunication would challenge the very *rationale* of existence of cities and would encourage decentralisation and return to nature in the 'electronic cottage'. However, time has proven that such prophecies were based on a misconceived and deterministic view of communication technology. The nature of telecommunication networks is nodal and, hence, they benefit from the spatial concentration of activities and high level of specialisation which characterises existing urban environments. They are not as dematerialised as originally thought and, indeed, are spatially manifest in real buildings and infrastructure and supported by real working people (Sassen, 1994). The city is enhanced economically by the installation of such networks, its global image is improved and its control of information expanded. Thus, it attracts further development. Finally, electronic communication could not become a substitute for human contact and physical movement and hence, although it has evolved dramatically since the 1970s, its effects on urban form and operation have not been conspicuous (Gillespie, 1992, pp67-78).

In the meantime, urban population in the developed world is stabilised at about 70% of its total population, while in the developing world urbanisation continues with accelerating speed. Many industrial cities in the West, such as Glasgow and Manchester, having faced the financial and social shock of de-industrialisation, are now forging new identities based on cultural or financial services, thus, manifesting an enduring belief in the value of urban life.

At the same time, awareness of environmental problems and of their global dimension grew rapidly. The need to protect the natural environment while ensuring conventional economic growth gave birth to the concept of sustainable development. Subsequently,

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[11] Interestingly, similar criticism has been addressed to the recent idea of the 'urban villages' promoted in the United Kingdom and the New Urbanists' projects in the United States of America, to which reference will be made in Chapter 3.

as mentioned earlier, the global nature of this concept gave rise to the question of the appropriate level at which it can be pursued in practice and be translated into operational and effective policies.

The sustainable development discourse identified the imperative to resolve problems of urbanisation and urban operation as a means towards the global goal. Hence, cities were identified as the appropriate scale of intervention in pursuit of sustainable development, instead of being dismissed as containing the seeds of global catastrophe.

2.2.4. Sustainable Development and the City

The most prominent set of guidelines towards sustainable development, namely *Agenda 21*, often refers to issues of urban management in its suggested course of action. In contrast to the doomsday scenarios of the 1970s, the sustainable development discourse views cities as containing part of the solution to the problems of the planet. This constitutes another manifestation of the pragmatic, managerial and practice-oriented stance of environmentalism in the 1990s as opposed to its visionary and utopian character in the early 1970s. At the same time, the discourse recognises the degradation of the immediate urban environment world-wide and the imperative to improve it in environmental, social and economic terms.

In effect, the multiplicity and complexity of problems of a contemporary city and the diversity of urban problems across the globe have been grouped and combined to form a single attribute, common to virtually all cities, i.e. unsustainability. This attribute seeks to describe both the decaying condition of the city as an entity, and its relation to the global environmental situation. In response to it, urban sustainability becomes an end in itself and a means towards the goal of sustainable development. Like sustainable development itself, urban sustainability is a global goal with local agendas towards it.

It should be made clear that the appropriateness of the urban scale for intervention can only be seen as one tier among the many requiring intervention between the global and that of the individual household. Cities are open systems and their operation and development is influenced, and often determined, by exogenous factors, for instance national policies or international treaties. Viewing the city in isolation would be unrealistic and counterproductive.

Before attempting a definition of a sustainable city, it is possible to summarise the three definitive themes that form the conceptual framework of the discourse on urban sustainability. They are:

- the redefinition of the role to the city in relation to the future of the global ecosystem: from being an evil leading to world-wide catastrophe to being a potential asset in the pursuit of the global goal of sustainable development;
- the redefinition of the relationship of the city with nature, i.e. the objective to establish a reciprocal, as opposed to a contradictory, relationship between the city and its natural context;
- the redefinition of the nature of the city itself by challenging the legitimacy of the mechanistic view fostered by modern planning and adopting metaphors drawn from biology and evoking organic unity, instead.

Given the dynamic nature of the concept of sustainability, as this was established in Chapter 1, a definition of a sustainable city can only describe processes, rather that the constituents of a predetermined sought-for condition. Bearing this in mind, a working definition for the purposes of this thesis could be as follows:

A city is sustainable when it develops and operates, catering equitably for the needs of its inhabitants, while minimising its detrimental effects on the immediate, surrounding and global environment.

This definition seeks to be more pragmatic than Rodney White's 'in tune with nature' (1994, p165) or Mayur's definition of a 'green city' as 'complete in its survival capacity' (1990, p38). It also seeks to allow more flexibility of means and ends than the bioregionalists' ideal for resources drawn exclusively from, and urban processes and boundaries directly determined by, what is identified as, 'the bioregion'[12] (Andruss et al., 1990). While the imperative for cities to respect their natural context is recognised, their critical position in the global economy has to be acknowledged. Finally, the suggested definition avoids 'naturalising' urban operation, i.e. it does not suggest it should follow natural laws, like those of an ecosystem.

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[12] David Harvey (1996, pp170-171) highlights the 'political implications of distinctively green values' of movements like the bioregionalism of the United States in America. 'For they -green values- are inevitably implicated in the construction of particular kinds of 'moral community' that can just as easily be nationalistic, exclusionary, and is some instances violently fascistic as they can be democratic, decentralised, and anarchist.

In the spirit of the concept of sustainable development, urban sustainability is not confined to physical urban issues. It also requires social equity and local community empowerment and aspires to revitalise declining central cores and reinvent traditional urban values such as vibrant public life and social exchange.

2.3. Themes of Urban Sustainability

Within the new conceptual framework, formed at the intersection of intellectual developments in urban planning and environmentalism, the totality of urban issues calls for redefinition. This section will go briefly through the issues that have been most radically affected by the new framework and have been dominating the discourse on urban sustainability and the practice towards it. It should be made clear that, because of its integrative nature, the discourse contains a variety of disciplines and directions and does not constitute a homogenous body of research or practice.

Resources used in the following section were published following the Brundtland Report (1987) or *Agenda 21* (1992), and in their majority recognise strong causal links between the management of urban issues and the pursuit of sustainable development as it is defined in these two formative documents. A few publications used preceded the Brundtland Report. Nevertheless, they are considered influential in shaping the conceptual framework of the current discourse.

2.3.1. Transforming 'Urban Metabolism'

Physical urban processes are directly affected by the repositioning of the city in its natural context, and by employing organic metaphors for its study. The management of all the vital operational processes of the city which entail inputs of materials and energy and outputs of waste, calls for a new approach. The general framework of the new approach is set by the imperative to 'redesign' the 'urban metabolism' in order to transform it from 'linear' to 'circular' (Girardet, 1992). Hence, the outputs of the 'urban organism' will turn to inputs again, pressure on natural resources will be reduced and so will the burden of hazardous wastes imposed on the surrounding and global environment.

The processes of the 'urban metabolism' that need to be redesigned towards that direction are:

- water management,
- sewage management,

- solid waste management,
- energy management,
- transport management and
- design and management of green spaces.

Their relevance to the discourse will be examined briefly .

One of the most significant criteria for selecting the location of pre-industrial settlements was availability of **water**. As urban populations grew bigger so did per capita demands on water and the need to bring water into cities from further and further afield. Global average of per capita consumption of water has increased by 100% in the last fifty years, threatening global reserves (Haughton and Hunter, 1994, pp165-173). This increase is not evenly distributed and there are huge differences in consumption between the developed and the developing world. People of the United States of America are the highest consumers of water in the world, consuming 2,000m^3 per capita per annum. Conversely, in the developing world consumption is much lower and there are still populations with no access to drinking water.

Water management is not a purely urban issue as much of the consumption is absorbed by industry and agriculture. There are, however, some aspects of it that are relevant to the sustainability of cities. Large concentrations of people in cities put pressure on surrounding watercourses or underground water reserves for high quality potable water. Increased demand can affect ecosystems, dry lakes and rivers and lower the water horizon of underground reserves. Also, urbanisation and the corollary increase of impervious paved and tarmacked surfaces, disturbs urban hydrology. More specifically, increase of impervious surfaces increases water run-off and, hence, ground water replenishment rates are reduced considerably (Douglas, 1983, pp51-58). Urban activities pollute surrounding watercourses and render them inappropriate for use. This problem is exacerbated when water quantity is reduced from overpumping, because the ability of the water to dilute pollutants efficiently is also reduced (Haughton and Hunter, 1994, pp173-179).

In order to reduce cities' detrimental effect on their ever growing hinterlands, water infrastructure and management need to be redesigned. Measures towards conserving water as well as ensuring its quality include educating the public to consume less, repairing leaking networks, using appropriate water for the appropriate use, e.g. using

greywater[13] for flushing WCs, watering and other uses, instead of using high quality potable water (Fewkes et al., 1996). Issues of architecture and urban design are also relevant, for example designing for rainwater collection or increasing pervious surfaces to increase the rate of replenishment of underground water reserves (Douglas, 1983, pp51-58).

The management of **organic waste** is another urban issue that is directly influenced by the idea of simulating natural processes and reducing urban impacts on the surrounding environment. As mentioned earlier organic wastes were used as fertilisers in cities in Medieval Europe, and are still used in Chinese and other Asian cities (Girardet, 1992, p162). However, this is not the case for most of the cities in the world which discharge their organic waste, in many cases untreated, in nearby surface watercourses. Thus, many nutrients, potentially valuable for agriculture, are wasted and rivers and coastal waters are heavily polluted and their aquatic ecosystems disturbed. Water pollution is caused by organic anthropogenic wastes and agricultural residues and by inorganic chemicals and minerals contained in the urban water run-off and in industrial residues (Haughton and Hunter, 1994, pp179-197).

Solid waste management is also under redefinition within the conceptual framework of urban sustainability. The imperative is for reducing the amount of waste that is currently produced in cities of the developed world. This, like most of the issues reconsidered, calls for changes beyond the level of urban management as well, like reducing packaging in industry, encouraging leasing rather than selling, repair and reuse rather than disposing, shifting to more frugal lifestyles etc. Although reduction of produced waste is the priority, recycling of waste can be part of the solution as long as it is co-ordinated with developing the relevant markets to absorb the secondary materials in a cost-effective manner [Blowers (ed.), 1993, pp80-85, Girardet, 1992, p151-152, Elkin et al. 1991, pp176-186, etc.].

At present, landfilling is still the most common practice for disposing most of urban waste. This is, however, a highly problematic practice which, apart from wasting recoverable resources, degrades the land and pollutes the air of the area surrounding the landfill site and its underground water courses. In addition, methane produced by landfill sites - also known as 'landfill gas' - is a potent greenhouse gas (Elkin et al., 1991, p172). Increasingly, cities face huge difficulties in designating new landfill sites

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[13] The term greywater is used for wastewater from the washing machine, the sink etc. except from the WC.

as local communities often oppose them on environmental grounds. Waste management impinges on many other urban issues like, energy, pollution, conservation of natural resources, water quality, local economics etc.

Energy planning has the most obvious links to global environmental problems like the accumulation of greenhouse gases in the atmosphere and the depletion of non-renewable sources of energy. It is also related to local and regional environmental problems, like atmospheric pollution and acid rain, respectively. Energy planning impinges on social issues as well. Intra-generational equity, one of the core elements of sustainable development, requires that energy planning ensures access to energy to the poor and disadvantaged members of the society in the developed and the developing world. The idea of equity between present and future generations, also central in the definition of sustainable development, requires that non-renewable resources are not wastefully managed and that the ecological balance of the biosphere is not further disturbed by fossil fuel combustion gases (Elkin et al., 1991, pp84-85).

In response to the *Framework Convention on Climate Change* (1992), requiring stabilisation of their CO_2 and other greenhouse gases' emissions by the year 2005 at the levels of 1990, signatory national governments are urged to devise energy conservation programmes. Nijkamp and Perrels (1994, pp20-22) advocate the appropriateness of the urban scale for sustainable energy planning, for the following reasons. First, the majority of economic activities, production, transportation and, hence, energy use is concentrated in cities. Second, the city is a 'well-focused study area' that can be managed effectively by one 'decision-making agency' thus avoiding compartmentalisation and overlapping of responsibilities. Third, at the urban level, it should be easier to ensure the public's direct involvement and support on which the success of any policy aimed at sustainability eventually lies. Finally, gathering data for the city is a more manageable task than for a bigger scale of reference.

Energy planning, however, cannot be seen in isolation as it impinges on all processes of 'urban metabolism'. Improving the efficiency of supply networks and of appliances, substituting renewable energy, like solar and wind, for fossil fuels, retrofitting existing buildings and designing and equipping new ones with a view to energy conservation, educating, or encouraging with pricing mechanisms, the public to consume less, are some of the directions promoted by programmes towards urban sustainability [Nijkamp and Perrels, 1994, Blowers (ed.), 1993, CEC, 1990, etc.].

The link between energy and transport planning is very important, considering that, in 1988, 30% of total energy consumption in the United Kingdom, a percentage higher than that consumed by industry and the domestic sector, was due to transport (Department of Energy, 1989, cited in Owens and Cope, 1992). This percentage is rising continuously as car ownership and travel distances rise and is, to a large extent, concentrated in or directed towards cities. Transport is also responsible for emission of many pollutants of global and local importance. Discouraging use of the automobile and encouraging non-motorised - walking and cycling - and public transport has acquired a central role in the discourse, one with social as well as environmental objectives [Blowers (ed.), 1993, pp111-115, Enwicht, 1992 etc.).

The design and management of green spaces in contemporary cities also involves imported amounts of energy for machinery, infrastructure, herbicides, pesticides etc., and is identified, within the sustainable cities discourse as unsustainable. Referring to urban parks, Hough (1984, p17) emphasises the amount of energy that is wasted 'to perpetuate an unchanging plant community' which is unable to evoke even visual links with nature as it is completely artificial and bears no reference to its natural context. He observes that the current function of open spaces is limited to recreation and aesthetic amenity as they are sterile and unproductive featuring internationally homogenous plants instead of self-sustained indigenous vegetation. Hough, along with other authors on urban issues (Davidson and MacEwen, 1984, Elkin et al., 1991), calls for the reappraisal and enhancement of the role of urban parks in the urban system. Urban parks, if designed with ecological rather than purely aesthetic criteria, could function as absorbers of atmospheric pollution and noise, climate controllers, reducers of water run-off, havens of wildlife, even food and timber producers. The same authors also stress the educational role of parks and their potential contribution to forging a new relationship between urban dwellers and nature.

Finally, in line with the holistic view evoked by biological metaphors for the city, links are identified between most processes of 'urban metabolism' and urban physical form. In view of these links, urban form needs to be reconsidered to become conducive to a cyclical 'urban metabolism' and to global sustainability. The nature of these links, the different levels of reference at which they are acknowledged by the discourse and the different proposals towards a sustainable urban form are discussed in the next chapter.

2.3.2. Local Economics and the Concept of Community

A city is not only a physical formation. According to Murray Bookchin (1974), the definitive feature of a city is neither the concentration of people and buildings, nor the development of the market nor the specialisation of labour. It is the sense of community, social exchange and participation in public life that constitutes a city and differentiates it from rural settlements devoted to managing agriculture. Bookchin observes that this function of the city is undermined or totally cancelled in the individualistic and alienating environment of contemporary metropolis. Social problems like unemployment, or decline of urban cores, unequal access to resources and services have been common in many cities of the developed and the developing world, and are not unrelated to strictly environmental problems. As Cadman and Payne put it (1990, p227):

> ...growth without international and national redistribution can only increase the alienation and desperation of those excluded from its benefits, creating a dangerous legacy for the future. As the traditional focus of such concentrations of economic growth, cities throughout the world encapsulate these extremes of wealth and exclusion and all evidence suggests that their social fabric is in urgent need of repair.

The global operation of economy is one of the globalising agents of environmental crisis, transferring hazardous waste across different countries and separating the beneficiaries of development from those who suffer from its detrimental by-products. At the same time, the global economy undermines the operation of local economies and, as a corollary, of local communities. An example of this effect is the social and financial dysfunction that many industrial cities in Europe and the United States experienced when their industrial base was taken over by the global market. The effects were not strictly economic. The local community was deeply affected as many manufacturing jobs were lost, the youngest, most skilled and mobile members of the community migrated, and poverty, unemployment and social decay struck the ones who remained (Donnison and Middleton, 1987). Another example of the effects of global economy can be observed today in cities of the developing world. Although foreign investment, national policies and international aid have a strong 'urban bias' local urban economies do not necessarily benefit from it as they are not the ones in control (Drakakis-Smith, 1987). Multinational corporations are in control.

It is not within the scope of most expressions of the urban sustainability discourse to forge economic self-sufficiency for cities, as this would be an unrealistic prospect given the economic environment in which cities operate, and of which they form a key

part. However, emphasis is drawn on investment which benefits the community and satisfies local needs rather than the requirements of multinational corporations, and generates social amenity rather than pure financial benefit[14]. Employing local natural and human resources and encouraging small businesses are also encouraged with a view to empowering local economy (Elkin et al., pp203-231, European Foundation for the Improvement etc., 1996). Apparently, Schumacher's ideas about small scale are being revisited.

The principle of 'subsidiarity', i.e. that decision-making should occur at the lowest possible level of organisation, is promoted in both the Brundtland Report and *Agenda 21* and is endorsed in the Maastricht Treaty by the European Union. *Agenda 21* encourages participation of all social groups in decision-making process and in projects' implementation, and emphasises the pivotal role of local authorities - 'as the level of governance closest to the people' - and NGOs towards sustainable development. The creation of *Local Agenda 21s* by most local authorities in each country by the year 1996 is one of the document's direct action requirements from its signatories. A product of a 'consultative process' involving the whole community, *Local Agenda 21* aims at empowering people and enhancing their control over their own locality (Quarrie, 1992, p200).

Enabling local authorities and encouraging citizens' participation have emerged as essential institutional responses to the complexity of environmental management, in general. Existing state institutions and administrative mechanisms are responsive to a different set of imperatives, most notably that of national economic growth. They cannot account for the emerging interdependence and complexity of environmental problems or their occurrence in many levels bridging the local with the global. The global operation of the economy and the concomitant challenge to the sovereignty of the national state reinforce the need for new institutional frameworks. Indeed, many commentators, declare a 'state failure' to confront such complexity and call for the enhancement of forms of 'a countervailing power', among which citizen's participation acquires a pivotal role (Dryzek, 1987, Janicke, 1990, cited in Eckersley, 1995, pp19-20, Beck, 1992).

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[14] LETS (Local Exchange Trading Scheme) is a scheme developed in Canada with a view to keeping local capital locally and resisting global economy, and revitalising local communities. It is currently operating in many cities in Canada and Britain. It is based on exchange of goods and services without the interference of cash (Girardet, 1992, p122, Seyfang, 1997, pp165-169).

The themes of inter- and intra-generational equity, central to the predominant definition of sustainable development, introduce social justice as a constituent and a prerequisite of urban sustainability. The issue acquires additional meaning within the discourse, i.e. 'the problems and conflicts relating to distribution in a society of scarcity overlap with the problems and conflicts that arise from the production, definition and distribution of techno-scientifically produced risks' (Beck, 1992, p19). The spatial distribution of environmental hazards and adverse circumstances within the same city is not even; the poor and the disadvantaged tend to occupy the areas with the most adverse environmental circumstances[15]. The Brundtland Report supports 'self-reliance and citizen involvement', assisted through government policies and NGOs, as a viable response to the environmental blight of the poor of cities in the developing world (WCED, 1987, pp248-250). Subsidiarity and public participation, enabled through increased access to information, is seen in many programmes towards sustainability as an essential step towards accountability and social justice (Elkin et al., 1990, Carley and Christie, 1992, Gilbert et al. 1996, etc.). Various lists of sustainability indicators, themselves a product of participation, are promoted as a tool towards wider access to information and citizens' involvement (see section 2.4).

Consistent with the integrative nature of the concept of urban sustainability, commentators acknowledge links between the concept of community and issues like transport or land use planning. Enwicht (1992), for example, suggests that social exchange - in his view the *rationale* of urban life - has been minimised in the contemporary metropolis, drawing evidence from low-density Australian cities. He advocates recovery of this crucial urban function as the prerequisite of moving *Towards the Eco-city*. Traffic-calming schemes and emphasis on public transport are Enwicht's main means towards materialisation of his vision. They are seen as the springboard for a number of other transformations like energy saving, pollution reduction as well as community enhancement. The idea of the self-contained neighbourhood is revisited with the same goal of forging a new sense of community within the city.

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[15] The movement of 'environmental justice' focuses on this relationship between environmental degradation and social deprivation. It emerged in 1990s in the United States and comprises a variety of localised protests against specific manifestations of environmental degradation in cities. The majority of protests emerged in poor urban areas inhabited mainly by ethnic minorities and hence illuminated the unavoidably social and economic nature of any environmental issue (Harvey, 1996).

2.4. Sustainability Indicators for the City

Responding to the requirements of *Agenda 21*, many cities have devised their *Local Agendas 21*. They have also compiled their own lists of sustainability indicators with a view to measuring their progress towards their targets. Such lists are also compiled by international agents like the European Union, or national bodies like the Local Government Management Board (LGMB), who suggest them as guides to individual cities to create their own lists. Each of these lists covers a wide range of urban issues, reflecting the comprehensive nature of the concept of sustainability.

In 1993, the city of Seattle produced a list of 40 indicators concerning the following four areas: environment, population and resources, economy, and culture and society. The latter area, to which most of the indicators refer, includes indicators like 'individual sense of well-being' or 'equitable treatment in justice system', testifying to the project's commitment to account for abstract and unquantifiable qualities of the urban environment. Such indicators, however, raise the problem of the validity of their monitoring as well as of their instrumentality in terms of informing policies towards change. It is important to note that the list was produced through collective work over a long period of voluntary work.

The LGMB (1994) initiated a pilot project, originally involving five local authorities in the United Kingdom. The objective was to provide those local authorities with the theoretical background and state-of-the-art information regarding sustainability indicators as well as with practical guidelines on how to develop their own lists. The project compiled a large number of indicators from thirteen thematic groups and encouraged each city to choose at least one indicator from each group to form one appropriate to its special circumstances. For example, Fife, one of the five local authorities participating in this project, chose the following twenty indicators (SEM, 1995, p8):

homelessness
affordable warmth
long-term employment
poverty
alternative means of transport
life expectancy
infant mortality
crime
nursery education
safety for pedestrians and cyclists
land quality
biodiversity
quality of surface and underground water
pleasant urban environment
air quality
agriculture
fisheries
household waste
sewage treatment and disposal
energy

The Regional Council of Fife arrived at this list after consulting organisations and individuals from the local community. Public participation in the creation of the lists is defined by the LGMB as one of the prerequisites of an operational and effective list. Indicators should also be simple so that they can be widely understood and should show progress in a reasonable period of time so that the community can follow their development.

It is interesting to note that virtually none of the indicators suggested by the LGMB refers to the actual materiality of the city, namely the urban fabric, and the way this operates and develops in environmental, social, cultural or aesthetic terms. The 'percentage of historic buildings which are 'at risk" is an indicator manifesting the project's interest in conserving the city's identity and imageability. Also, at the planning level, 'numbers of development breaching the Local Plan' testifies to the special interest of the LGMB in protecting the countryside from urban invasion. Urban architecture, however, is not accounted for. This omission is noticeable in all lists of sustainability indicators and reflects, on a practical level, a theoretical gap of the discourse on urban sustainability.

More specifically, the investigation of the interaction between all physical and non-physical processes of the city advocated by most commentators on urban sustainability fails to identify urban architecture among these processes. The next chapter, which will examine the way urban built form has been approached by the discourse, will argue that this marginalisation of the role of architecture is an outcome of the universal nature the problem of urban unsustainability has assumed.

The urban issues that are identified by the discourse as wanting reinvestigation and their corresponding indicators are gradually crystallising to a single body of supposedly universal validity. The promotion of such universally common currency seems to be the intention of Nijkamp et al. (1996, p2) when they suggest that 'a single sustainability index', a numerical expression of an aggregate of many criteria, 'should be able to tell us whether the city is becoming more sustainable or not'. Underlying this assertion are two problematic assumptions; first, that the constituents of sustainability and their desired values are known and, second, that this sought-for condition has the same features and values at all places and times.

Indeed, the same assumptions underlie most programmes towards urban sustainability. Hence, the issues discussed within the discourse have crystallised to a

constant list, mainly engendered by the employment of the metaphor of the ecosystem for the city. In turn, the models proposed towards the sustainable city emanate from the objective to emulate the operation of a natural ecosystem and amend its relationship with the biosphere. However, the search for the global constituents of urban unsustainability and the subsequent search for a global model of urban development may marginalise issues that form the driving force of unsustainability for some cities, while being irrelevant to others.

2.5. Concluding Remarks

The discourse of urban sustainability has been the outcome of transformations in urban planning and in environmentalism. Transformations in the former took the form of a full-fledged criticism of the exclusive and universalistic character of the theoretical principles of urban planning and the urban environments they had created. Transformations in the latter occurred as a gradual shift from advocating the self-governed and self-sufficient community as the alternative to the evils of the city to promoting the city as a potential asset towards the global goal of sustainable development.

The new conceptual framework, that was formed on the intersection of these developments, dictated reinterpretation of the nature of urban issues and illuminated links between them and also between them and the balance of the local and global ecosystem. The current unsustainable development and operation of the city has been identified as a global problem and its constituents were sought for by many commentators and local or international agents in response.

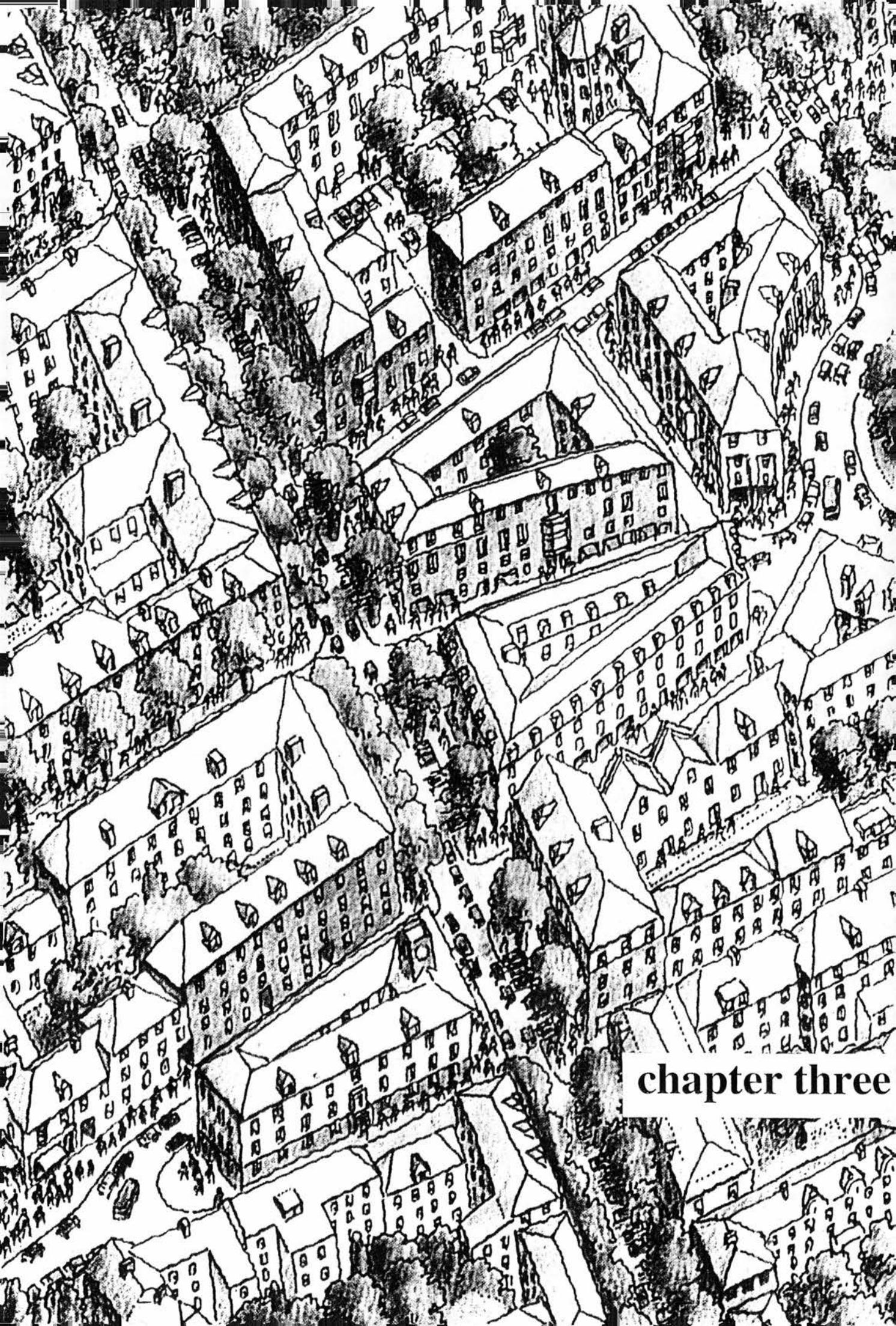
Many urban issues are revisited by the sustainable cities discourse. They are seen as components of the urban system, which is open to a wider system comprising the whole globe in physical, economic and social terms. This holistic view of the city, overcoming disciplinary and administrational boundaries in favour of a better understanding of its function and impacts, can be seen as the most important contribution of the sustainability discourse to urban planning. Ironically, biological metaphors, which have been used to promote this holistic view, have also formed a comfortable ground for the universality of the discourse to develop.

Adopting the metaphor of the ecosystem, 'the city' becomes an entity with specific ecosystemic operations linked with each other with structural relationships, irrespective of the place, the culture or the social structure. Giving this urban

ecosystem a significant role towards the balance of the global ecosystem gives every 'city' the same task to fulfil, i.e. to approximate the operation of a natural ecosystem and thus reduce its overall impact to the biosphere. Testimony to this universal objective is the fact that the same themes are presented as crucial by almost all proposals towards urban sustainability and similar causal relationships are identified between them. For instance, it is almost common place within the discourse that traffic calming encourages community building or that high mixture of land uses discourages automobile travel. There are, however, cities for which such links are not valid due to social or cultural differences or to which they are completely irrelevant. Perceived as a means towards a global goal, urban sustainability has assumed a universal nature. Thus, the discourse harks back on the universalism of orthodox modern planning to which it strives to suggest an alternative.

Apart from universalising, the predominantly environmental focus of the sustainable cities discourse also tends to evade social differentiation. Reducing a city's 'ecological footprint' or 'redesigning its metabolism' to approximate that of a natural ecosystem are metaphors aiming mainly to address the environmental impact of rich cities of the developed world on their ever growing hinterlands. Even within these cities, however, biological metaphors do not account for uneven distribution of environmental degradation among people of different class, income, race, etc. In the case of poor cities of the developing world the inadequacy of these metaphors becomes more obvious. The unsustainability of poor cities is more a matter of addressing the immediate environment rather that its effects on the global ecosystem. In other words, in both rich and poor cites assigning a 'biological basis' to urban problems and their solutions allows for 'loss of social thinking' (Beck, 1992, p25). Although biological metaphors can be a useful tool of analysis of urban physical operation and its effects, they are arbitrary reductions when proposed as containing the solution to the unsustainability of 'the city' world wide.

To sum up, it may be said that the urban sustainability discourse has identified a number of issues as the universal constituents of the unsustainability of cities as well as the causal links between them. Subsequently, the constituents of a sought-for condition have been recognised and have already dictated policies and guidelines towards urban sustainability. The use of the ecosystem metaphor has helped to accommodate this universalistic approach to the city and to marginalise contextual variations. The next chapter focuses on the way physical urban form is approached within the new conceptual framework.



chapter three

CHAPTER 3

SUSTAINABILITY AND URBAN FORM

3.1. Introduction

The significance of urban form in the pursuit of urban and global sustainability is acknowledged in most comprehensive programmes, theoretical or practical, towards the sustainable city. This chapter focuses on the way physical urban form is approached within the new conceptual framework for the study and management of urban issues.

Within the sustainable cities discourse, urban form becomes one of the components of the urban system linked reciprocally to the rest of the components. It also acquires new links with processes operating at regional and global level. The imperative is to identify the urban form that is most conducive to urban sustainability and most likely to contribute to the attainment of regional and global sustainable development.

The variety of views regarding sustainable urban form can be classified in three categories based on the scale at which they draw their emphasis. The scales at which intervention is considered meaningful and instrumental to the shift towards sustainability have crystallised in the following:

- the city as a whole,
- the neighbourhood, and
- the individual building.

This chapter reviews critically the definitive themes of each of these three levels of focus and identifies important unrecorded gaps between them. The second part of Chapter 3 seeks to unravel the common assertions and intellectual problems underlying the ways urban form is approached.

3.2. Towards a Sustainable Urban Form

3.2.1. The City as a Whole

The prevailing level of analysis within the sustainable cities discourse is that of the city as a whole placed in its regional and global context. At this level, the integration of land use and transport planning has been identified as a pivotal step towards urban sustainability, one in accordance to the 'precautionary principle'. Initially, suggested with a view to introducing the energy dimension into land use planning considerations

(Owens and Rickaby, 1983, pp150-159), at present, it has extended its scope to issues like social equity (Enwicht, 1992) and quality of life (CEC, 1990).

Susan Owens and David Cope (1992), in a publication of the Department of the Environment of the United Kingdom, emphasise the importance of land use planning as a proactive policy instrument against, as well as one reactive to, climate change. They examine the links between land use planning and a number of responses and policies related to climate change like different energy supply options (gas, biomass, tidal, wind, Combined Heat and Power / District Heating, nuclear), changes in agriculture, management of water supply and demand, etc. Reducing the need to travel, shifting to public and non-motorised modes of transport and designing energy conscious buildings are among the responses to climate change found to have strong links to land-use planning.

Identification of the links between land use, transport and energy planning has created a renewed confidence in large scale urban planning (Breheny, 1996, p13). The latter has been largely discredited since the failure of rational Modernist master-plans, adhering to the principles of the *Charters of Athens* (1933), to create livable environments. Since the early 1970s, market-led development and piecemeal restorative intervention have been the norm in planning theory and practice in the Western world. Within the search for the most energy-efficient, resource-conserving and community-enhancing urban form, however, land-use planning at the level of the whole city placed in its region is appreciated again as a policy instrument towards the 'compact city' (CEC, 1990, McLaren, 1992, Sherlock, 1991, Enwicht, 1992, etc.).

The compact city is the most salient proposal for a sustainable urban form. Its most central propositions are the following:

- Expansion of the city must be constrained. Development should ideally be contained within the city's existing boundaries. Towards this aim infill and brownfield development must be encouraged, as opposed to development on greenfield sites.
- Densities of new developments must be high, compared to existing suburban ones.
- High mixture of land uses must be encouraged, and strict zoning on the basis of function must be relinquished.

Cities and Automobile Dependence: An International Sourcebook (Newman and Kenworthy, 1989) can be mentioned as the publication that granted significant momentum and, in a way, validated with 'hard' statistical data, the cause for integrating land use planning with energy and transport planning to promote the 'compact city'. Newman and Kenworthy conducted research in 32 cities around the world[1], gathering data with regard to their densities, modal split in transport and gasoline consumption. The results of this research clearly relate high energy consumption and low use of public transport to low density urban development. European cities, traditionally featuring high densities, are found to have low energy consumption levels. Hong Kong, with a whole city density[2] of 293 people per Hectare, probably the highest density in the world, is found to consume the least amount of fossil fuel. At the opposite end, North American and, to a lesser extent, Australian cities, exhibiting extensive low density residential sprawl, show the highest dependence on automobile and the highest levels of energy consumption (figure 3.1.). Newman's and Kenworthy's interpretation of the research data leads to the conclusion that low densities and functional segregation are the main culprits for high consumption of fossil fuels. Subsequently, it leads to the authors' guidelines towards more resourceful cities, namely, constraint of the spread of residential suburbia, increase of urban densities and encouragement of high mixture of uses.

Newman and Kenworthy do not relate the results of their research to the variety of the social economic or cultural features of each city. These features, however, influence people's behaviour, energy consumption and automobile use included. Furthermore, typically, they did not draw any evidence from cities of the developing world. Given the fact that 13 of the world's 20 largest cities are in developing countries, many still growing at unprecedented rates, the above is a serious omission (UN, 1987). The exclusive and deterministic nature of this research has been criticised and the results have been found partial and unfit for universal generalisation or constructive use. Nevertheless, they have been quoted extensively and often used as the scientific validation of the energy merits of the 'compact city'. The latter is the most salient strand of thought in the search for the sustainable urban form.

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[1] Five of the cities studied by Newman and Kenworthy are situated in Australia, one in Canada, ten in USA, one in the USSR, twelve in Western Europe and three in Asia (Hong Kong, Singapore and Tokyo).

[2] 'Whole City Density' is the population of the city divided by the area that the city occupies. Planning authorities more often use 'Net Residential Density' which is calculated dividing the population of the city divided by its area excluding all land that is not occupied by housing.

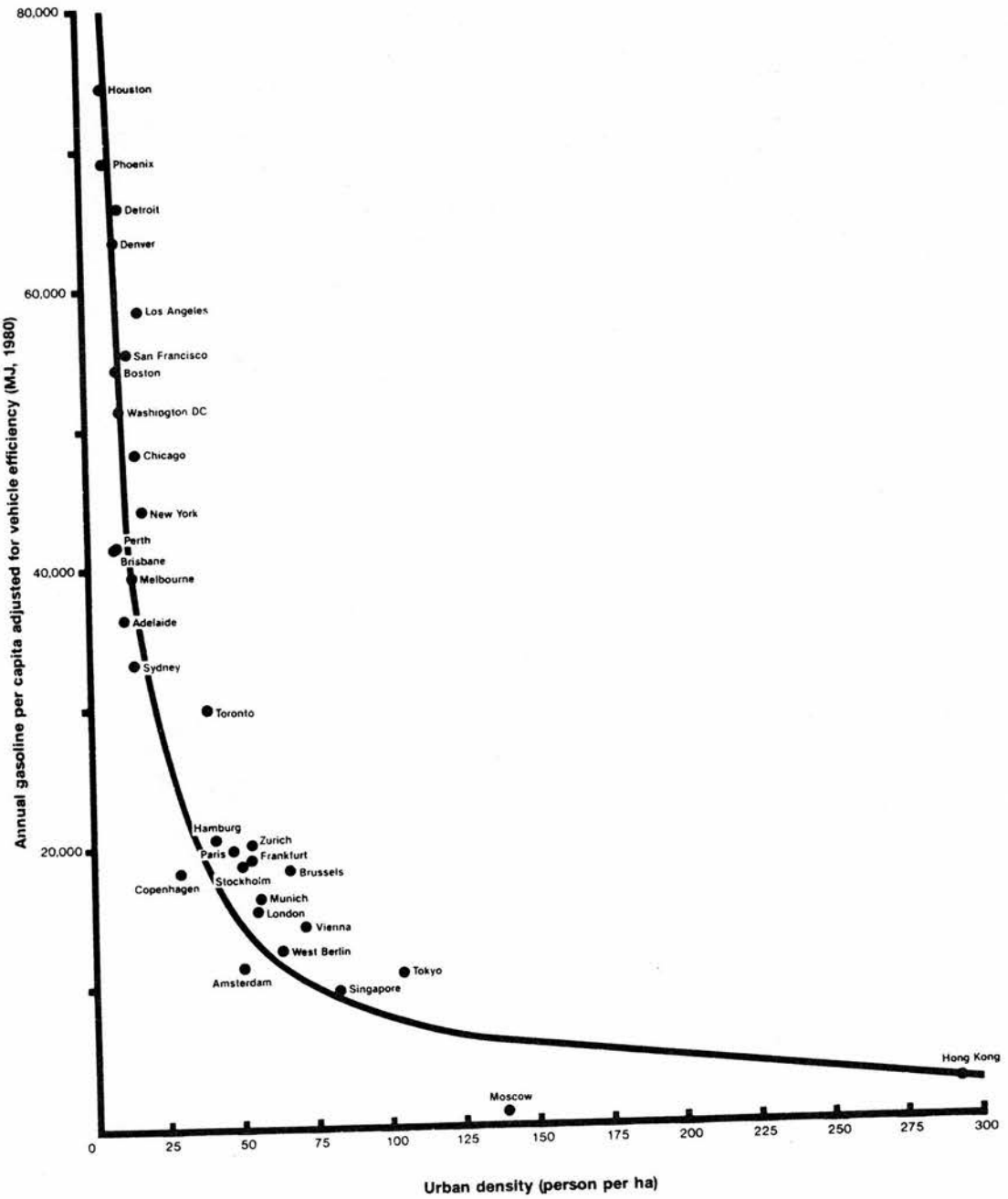

Figure 3.1. Urban density of 32 cities around the world and their gasoline use per capita, adjusted for vehicle efficiency (Newman and Kenworthy, 1981)

There is much controversy, however, regarding the validity of the links between travel patterns and land use planning and the extent of their effects. Research carried out by the UK Departments of Environment and Transport suggests that land-use planning can result in 10-15% reduction in CO_2 emissions in the next twenty years (quoted in Owens and Rickaby, 1992, p249). However, there is no consensus of opinion regarding this projection and, at present, there are many commentators who argue that urban compaction alone may only create the potential for less travel. It is not certain whether this potential will affect people's travelling patterns and in what time scale the effects will be discernible. Furthermore, it has been suggested that more direct measures of fiscal nature like fuel tax, or road pricing could be more effective in influencing travelling habits.

Compaction and containment of the city is translated in intensified use of existing urban cores, many of which are currently degraded, occupied by non-residential uses or gentrified. The rediscovery of the centre, harking back nostalgically on traditional pre-industrial cities seems to be the emphasis of White (1994), Sherlock (1991) Elkin et al. (1990) and the Commission of European Communities (1990) as part of their comprehensive programmes towards urban sustainability. Therefore, the benefits of pursuing the compact city would not be strictly environmental. On the contrary, faithful to the integrative spirit of sustainable development, the compact city cause pleads competent in a wide range of urban issues. Some of the benefits, as pronounced by the proponents of the cause, would be the following.

- The need to travel, as well as the length of travelled journeys could be reduced, as most required facilities would be available within walking distance.
- Public transport could become viable.
- Non-motorised modes of transport, i.e. cycling and walking, will be encouraged by short distances.
- Combined Heat and Power (CHP) and District Heating plants will become more applicable.
- High density development, in the form of terraced houses and flats, has less energy requirements compared to detached houses, other things being equal.
- Costs and resource demand for infrastructure (roads, utility networks etc.) could be reduced.
- As a corollary to all the above, energy consumption and atmospheric pollution of local and global significance could be reduced.
- Agricultural land will be safeguarded.

- Social exchange and public life will be encouraged.
- Urban cores will be revitalised and re-occupied by a mixture of uses.
- Disadvantaged groups of society, who cannot afford or cannot drive a car, will gain access to more facilities, and hence social equity will be promoted.

The compact city is not the only urban form originating from the integration of energy, transport and land-use planning, and pleading a crucial role towards sustainability. A prevailing alternative, claiming to lead to the same environmental and social benefits as the compact city is coined 'concentrated decentralisation' (Haughton and Hunter, 1994, p293-295) 'decentralised concentration' (Elkin et al., 1991, p16) or 'concentrated deconcentration' (van der Valk and Faludi, 1992, p122-137). The above terms denote the development of dense centres of commercial and social activities, jobs and residences, green spaces and leisure within or around existing conurbations, strategically located on efficient regional transport networks. This kind of nodal urban development is not contradictory to the compact city. In fact, Elkin et al. (1991) promote the combination of both in their programme towards the sustainable city and McLaren (1992, p272) suggests it for 'cities which are already too large to work efficiently with only one centre'.

Integration of 'land-use and transportation planning to encourage development patterns that reduce transport demand' and 'improved management of urban expansion' are among the activities suggested by *Agenda 21* (Quarrie, 1992, pp79-83). 'A rare case of politicians racing ahead of academics' (Breheny, 1996, p13), the compact city model has been also endorsed by international treaties and promoted by national legislation in many countries of the developed world. At the regional level, the *Green Paper for the Urban Environment* published by the Commission for the European Communities (CEC) in 1990 promotes whole-heartedly this model of development for the future of the European city. The *Green Paper* suggests (CEC, 1990, p40):

> Strategies which emphasize mixed use and denser development are more likely to result in people living close to work places and the services they require for everyday life. The car can then become an option rather than a necessity.

The same model is suggested by the *Aalborg Charter for European Sustainable Cities* (1994).

At the level of national legislation, the compact city has been the 'planning doctrine' of the Dutch since the mid-1980s. Responding to decline of population and income in urban centres in the 1980s, the central government in collaboration with large cities' municipalities, allocated initially more housing in cities, followed by more offices and infrastructure (van der Valk and Faludi, 1992, pp123-124). In the Housing White Paper *Our Future Homes*, the British government (1995, p11) committed itself to contain 50% of all new residential development on re-used sites by the year 2005. Planning policies in many cities in Canada, Australia and the US are, at present, also encouraging higher densities and the use public transport. This constitutes a considerable shift from their post-war practice. Until the early 1970s, planning in most of these cities focused on facilitating increasing automobile traffic and providing the necessary infrastructure to serve the suburban sprawl (White, 1994).

Michael Breheny has been among the most vocal sceptics towards the compact city as the sustainable urban form. Basing his criticism on the *Green Paper for the Urban Environment*, he points out six contradictions inherent in the document's quest for urban compaction (Breheny, 1992, pp138-159). To begin with, he questions the energy merits of high densities and mixed uses and stresses their contingency on issues like fuel taxes. Second, he highlights the contradiction between high density development and the protection of green open spaces. Third, Breheny sees a contradiction in the fact that high urban densities restrict the use of solar or wind energy. Improved quality of life in the city is the fourth of the *Green Paper*'s assertions that Breheny doubts. He points to people's sustained tendency, especially in the United Kingdom and North America, to move to the suburbs. Scepticism towards dense urban living and the merits of 'urbanity' is shared by other commentators. Stretton (1989), for instance, supports low-density suburbs instead, as being conducive to creative family life.

The fifth contradiction highlighted by Breheny is that between high urban density and the development of telecommunications which create the potential for further decentralisation. Negation of the city's *rationale* by telematics is a theme carried over from the 1970s. Given the dramatic expansion of telecommunication networks since then, their effect on the future of the city is, at present, even more pertinent and is widely discussed (see Graham and Marvin, 1996). As mentioned earlier, Sassen (1994, pp1-8) argues that telecommunication networks emphasise rather than negate the spatiality of cities and attract further development in the urban cores rather than spread it in the countryside. Nevertheless, Breheny's point helps illuminate the

variety of issues that impinge on the development of urban form, and the futility of assuming linear causal relationships.

Finally, the sixth contradiction highlighted by Breheny is that intensification of the urban core may undermine the economic development of rural areas further, as they will be deprived of opportunities for investment. The same fear is expressed by Faludi and van der Valk (1992, p124), who write that 'rural communities... are left in limbo' after the adoption of the compact city doctrine by the Dutch government. The same authors also point out that the previous policy adopted by the Dutch, namely concentrated decentralisation, also proved problematic, as cities 'suffered a decline in population, public services and employment, and their income was being eroded' (1992, p123).

Breheny's critique unravels broad generalisations and assumptions contained in the cause for the compact city. In a similar vein, the majority of critics of urban compaction or decentralised concentration focus on the uncertainty of the cause's energy merits as they stem from impartial and empirical evidence. Indeed, the most debated issue regarding the two models is whether land use planning can influence travelling patterns or not and to what extent. However, it can be argued that, there are more profound intellectual problems in the models than their lack of scientific documentation. Following is an examination of these unacknowledged intellectual problems, which, it can be argued, render the cause unproductive and, in some cases, counterproductive.

First, the compact city model addresses the physical form of the low-density sprawling city and identifies it as unsustainable. In response it suggests an other physical form. In this way, it deals with the symptom rather than with the cause of the problem. The processes that have brought this form about and the ones that reproduce it are not accounted for. In other words, the city is seen as a 'thing' independent of the human processes that shape it (Harvey, 1996).

In the cases where the causes are examined, a direct linear relationship is assumed between urban built form and the regulatory framework through which it developed, or more conspicuously, between urban built form and planning ideologies. Modern planning principles are often blamed for unsustainable urban development. Nevertheless, urban built form is shaped by a variety of interacting processes, which often defy official planning doctrines and prevailing planning ideologies. North

American low density suburbia - hailed as the most unsustainable urban form - does not represent simply the planning choices of the state authorities. It manifests spatially socio-economic processes and cultural preferences. To begin with, North American suburbs, the construction projects they initiated and the car-related industry they encouraged, played a central role to the economic growth of the United States in the post-war period (Harvey, 1996, p414). Moreover, they reflect, and promote further, income- and race-based segregation of urban populations (Stretton, 1978, pp149-151) It can also be argued that, North American suburbia is the direct manifestation of North American people's preference to live in the country. In that sense, Los Angeles maybe one of the most car-dependent cities in the world but it may also be seen as the way 'the mass of people, given the chance to decide for themselves, really want to live' (Davie, 1974, cited in Stretton, 1978, p291).

In addition, sustainability itself, the objective of the compact city, is not, as Clayton and Radcliffe (1996) have stressed, a static state. It is dynamic. It is impossible to specify its exact constituents for any place over time, let alone to designate its physical receptacle. Conversely, it should be possible and constructive to investigate the interacting processes that produce and reproduce unsustainable physical characteristics and counteract them through an incremental and reflexive process.

Second, the compact city is promoted as a universally valid model of sustainable urban form. In effect, the variety of physical urban forms, social structures, economic conditions, development stages, cultural contexts etc. manifest in the cities of the world are disregarded. The city is seen as having a nature of its own, independent of all the above contextual factors. Subsequently a single physical attribute - high density - is suggested as able to trigger a number of transformations towards sustainability.

Arguably, this universalistic approach to urban form is emanating from the perception of the city as an obstacle against and a potential means towards the global goal of sustainable development. In the same way that the latter has been theoretically defined and officially pursued with a Western bias, the compact city has been formulated as a response to the North American and Western European urban context. The despised as unsustainable low-density dormitory suburb and the underused decaying inner city may be features of North American, West European and Australian cities. They have been the result of specific economic and social and cultural processes, developments in technology as well as of official planning policies and ideologies in urban planning.

Regardless of its effectiveness to change, the model of the compact city does address urban problems of these contexts. Conversely, its relevance to, say, a city in the developing world or one in Eastern Europe is minimal as each one of them has been the outcome of a unique combination of different processes and faces entirely different problems. Nevertheless, the model is endorsed and promoted by academic papers and international documents as the sustainable urban form for an idealised contemporary city with intrinsic properties and a fixed position in the global ecosystem.

This universalistic approach is identifiable in the way Newman's and Kenworthy's (1981) research has been conducted and interpreted. The researchers isolated specific attributes - urban densities, modal shift in transport and gasoline consumption - from an extreme variety of contexts. The resulting measurements were assumed to have linear, causal relationships between them and, therefore, could work as guidelines for policies for urban environments universally. Elkin et al. (1991) specify in the introduction of their book that their 'report is relevant almost exclusively to the 'developed countries" assuming commonality of problems and hence, of solutions, among them.

More conspicuously, the universalistic nature of the cause for compaction is observable in the *Green Paper for the Urban Environment* (CEC, 1990) when it becomes an official set of guidelines for the variety of urban environments that belong in the European Union. The same document exhibits blatantly the Western bias of the cause. It recognises among the 'root causes of urban degradation' in Europe the ideological adherence of modern town planning to strict functionalism "expounded in 'The Charter of Athens'...also to be found in the earlier British Garden Cities movement" (CEC, 1990, p26). More specifically (CEC, 1990, p40),

> the strict zoning policies of the past decades which have led to the separation of land use and the subsequent development of extensive residential suburbs have in turn stimulated commuter traffic, which is at the heart of many of the environmental problems currently facing urban areas.

Such an interpretation of the problems of the European cities overtly ignores the fact that most Southern European cities have developed in entirely different ways from those in the North and West. Industrialisation and urbanisation started later in the South and were not causally related in the way they were in Western Europe. Official urban planning also started later in Southern Europe [Wynn, (ed.), 1984]. Most importantly, in Southern European countries, official planning has, more often than

not, failed to control urban growth effectively, and 'informal planning' in the form of unauthorised settlements is a common characteristic. Cities in Southern Europe, many of which are still developing, suffer problems emanating from absence of planning rather than from the implementation of strict functional zoning.

Resulting from a historically different urbanisation process, cities in Greece and, arguably in other Southern European countries, feature no or very limited low density residential suburbs and present a wide, sometimes even detrimental, mix of uses almost throughout their fabric (Hastaoglou-Martinidis et al., 1993, pp240-252). High density of development in many cases is a recognised problem, as it restricts opportunities for green and public spaces and transport management. It may be said that, the adoption of the policy framework suggested by the *Green Paper* in such environments would not only be irrelevant; it could even be harmful. The *Green Paper* is an example of the institutionalised 'top-down' approach to sustainability favoured in the 1990s and an illustration of its possible limitations.

The third intellectual problem of the cause for the compact city is its underlying belief in a deterministic physical environment which could dictate specific behaviours to its users. People's behaviour, including travelling patterns and social exchange, are formulated by a variety of factors acting over long period and are not solely the result of urban form. Although the effect of space on social behaviour and personality development is at present commonly accepted, it is not deterministic or exclusive. In fact, the opposite effect is also valid; namely that space is shaped by people's preferences. In turn, these preferences are shaped by a number of social, economic and cultural parameters. The relationship between form and human processes is reciprocally interacting, rather than deterministic in either way. Therefore, even in cities to which the compact city model is relevant, namely North American, Australian and, to a lesser extent, West European, it is highly questionable whether urban form can direct any recordable shift in people's long-registered preferences.

3.2.2. Rediscovering the Neighbourhood

The neighbourhood is the second level of focus prevailing in proposals towards sustainable urban form. At the regional level these proposals promote the idea of 'decentralised concentration'. The projects of the New Urbanists in the United States, also known as Neo-Traditional Developments (NTDs), and the concept of the Urban Village in the United Kingdom exemplify this trend towards the rediscovery of the neighbourhood as the elementary unit of urban change.

The inspiration of both the above can be easily identified in Ebenezer Howard's network of Garden Cities and Patrick Geddes's idea of the region although the co-operative character of the late-19th and early-20th century visions has been neglected[3]. Furthermore, both the New Urbanists and the Urban Village Group draw heavily from equivalent trends in early 20th century planning in the United States. The concept of the 'neighbourhood unit' was introduced by Clarence Perry as early as 1923 and developed to acquire its pedestrian- and community-friendly nature by Clarence Stein and Henry Wright in the late 1920s (Hall, 1994, pp122-132).

Since 1993, a number of architects and urban designers in the United States of America, most notably Peter Calthorpe, based in California, and Elizabeth Plater-Zyberk and Andres Duany, based in Miami, have been grouped together under the title New Urbanism. The latter suggests their common disillusionment with monofunctional suburbia and their shared belief in a tradition-derived alternative. New Urbanism has currently acquired the scale and unity of a new movement in urbanism. Calthorpe's book *The Next American Metropolis* (1993) presents what came to be the creed of the movement. He suggests the creation of Transit Oriented Developments (TODs) to accommodate and promote the new, modified, environmentally-sound and communitarian American Dream.

> TOD is a mixed-use community within an average 2,000-foot walking distance of a transit stop and core commercial area. TODs mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents and employees to travel by transit, foot or car (Calthorpe, 1993, p56).

TODs can be either new, in vacant infill sites in the existing fabric or in New Growth Areas, or redevelopments of existing areas. In the latter case, redevelopment implies diversification of land uses, densification of the built fabric and intensification of the areas' links to regional transport networks. In the former cases, planning should begin at the level of the region, to ensure transport infrastructure, and reach the level of the individual building.

Calthorpe's and the other New Urbanists' visions, already put to practice in many cases, go beyond pure environmental concerns. They aspire to create a 'modern version of a traditional town' (Calthorpe, 1993, p16), with its physical features of

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[3] Both Howard's and Geddes's ideas were influenced by the anarchist tradition of the 19th century. They both had social visions to accompany their physical plans (see Hall, 1994, pp91-94 and 137-148).

pedestrian lanes, porches and corner shops as well as its non-physical values of intimacy, frugality, social diversity and community sense. New Urbanist projects are initiated by local planning authorities, environmental groups or the property market. It is important, however, that the community is involved, actively and from the early stages, in the decision-making and the design process.

Architecture is one of the constituents of this 'redefined American Dream'. Generated by detailed design codes or from a number of designated building types, it takes root in the 'traditional American house' to create houses evoking a unified vernacular character for the whole neighbourhood. Traditional forms are assumed to stimulate traditional 'timeless values' in the lifestyle of the North American suburbanite.

Realised New Urbanist projects, however, have failed to produce much more than the village-like formalistic street plans, lined with homogeneous neo-vernacular houses. Diversity is apparently not materialised in physical terms. It is not materialised in social terms either, as the new developments tend to attract a specific upper- and middle-income audience. In addition, projected commercial and civic centres or shops were not always executed as they were not found profitable enough by developers[4]. The above resulted ironically in residents using their automobiles as much as they did before, if not more. In general, it is difficult to spot the difference between NTDs and the despised suburban sprawl. Finally, local transport managers and transport experts do not always agree with the appropriateness of the regional transit network, particularly when costs are considered. The lack of it, however, results in an isolated suburb whose residents would have to travel everywhere by car (Landecker, 1996, p70).

Architecturally, the New Urbanists insist on the value of imitating traditional types and forms, which can be drawn from the immediate context or borrowed indiscriminately from the international vocabulary of vernacular styles. This stylistic approach responds to the disillusionment of the public with Modern elitism, and the public's need 'to carve out at least one knowable world from the infinity of possible worlds which are daily shown to us on television' (Harvey, 1992, p351). It seeks to offer a sense of stability and rootedness in a transient and homogenising world. Andres Duany and Elizabeth Plater-Zyberk have exaggerated this scenographic simulation of

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[4] The developer of Peter Calthorpe's project Laguna West in the Sacramento area, California, cancelled his plans for a big commercial centre in the neighbourhood on financial grounds (Landecker, 1996, p69).

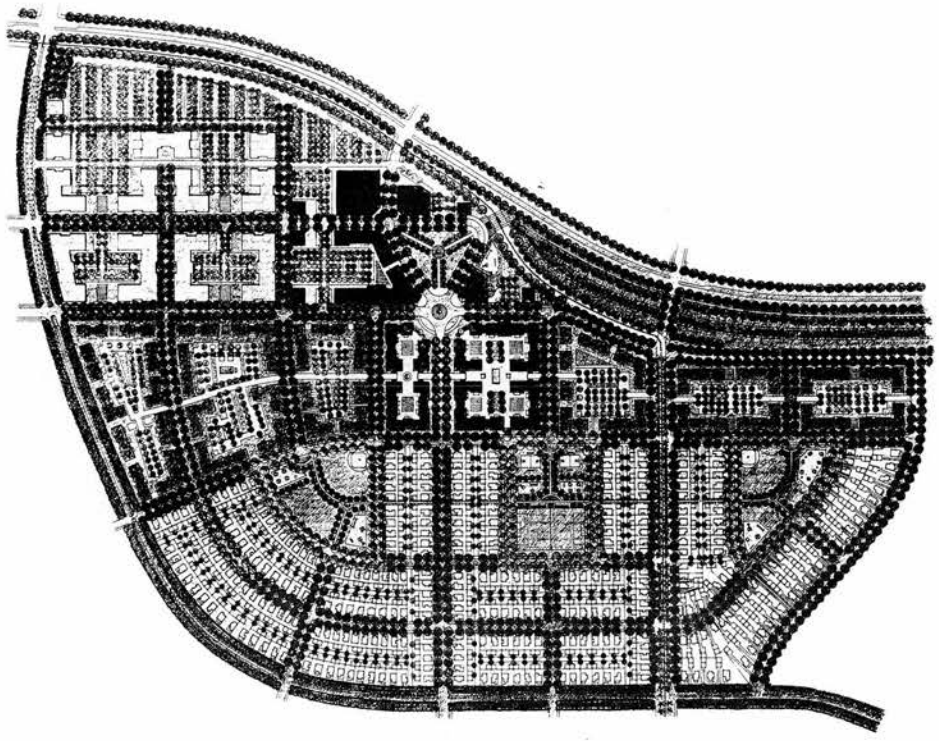

Figure 3.2. New neighbourhood in Sacramento, California, USA (Calthorpe, 1992).

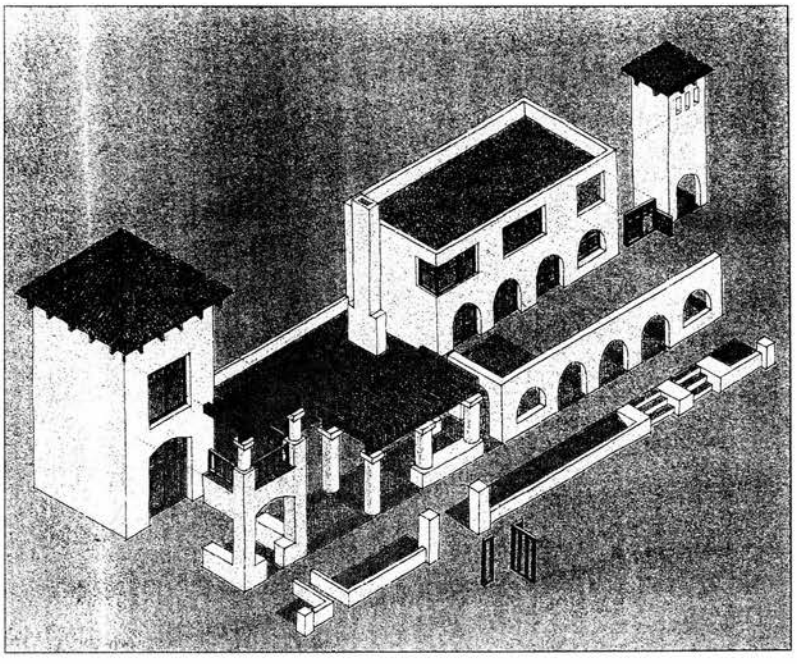

Figure 3.3. The 'architectural vocabulary' of a new 'station area' in San Diego, California, USA (Calthorpe, 1992)

stability and locality. The Mediterranean-style houses of their project Coral Gables in Miami 'were given an artificial patina during construction process so as to give an immediate impression of being lived in, of being steeped in time and history' (Culot, 1997, p132).

New Urbanism is the postmodern response to the lack of 'sense of place' of the North American suburbia, often attributed to the universalistic principles of Modern architecture and the functional segregation fostered by Modern planning. By reproducing a paper-thin image of tradition, in effect, commodifying it, New Urbanists claim they can recreate traditional communities and lifestyles. NTDs, however, are, what David Harvey calls, 'simulacra'[5] of communities rather than real communities. As such they can thrust neither a sound transformation of the local urban fabric towards sustainability nor a sustainable social and cultural environment. As philosopher Paul Ricoeur writes, commending on the feasibility of local cultures in the context of globalisation, 'the problem is not to simply repeat the past, but rather to take root in it in order to ceaselessly invent' (Ricoeur, 1965, p282).

Equivalent to New Urbanism in the United Kingdom, drawing from the same planning traditions, is the concept of the Urban Village. Unlike New Urbanism, which grouped retrospectively independent architects and urban planners, the British equivalent was launched by the Urban Villages Group, 'a group of individuals, drawn from the house-building and property industries and the financial and professional groups which support development in Britain' (The Urban Village Group, 1992, p11). The Group is supported by the Prince of Wales and the leading figure in the formulation of the architectural and urbanistic aspects of the concept has been, architect and urban planner, Leon Krier. The latter's earlier introduced idea of the *quartier* is, in fact, the central point of the Urban Village Group. The *quartier* is an area of maximum 23 hectares combining all urban functions for a community of 10,000 to 15,000 people. Organising the city in *quartiers* is, in Krier's view, the only way to repair the destructive consequences of Modernism on the urban fabric (Broadbent, 1990, pp194-198).

The Urban Villages Group has identified a number of attractive attributes, like 'community spirit, pride of place and a sense of belonging...flourishing micro-scale

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[5] 'By "simulacrum" is meant a state of such near perfect replication that the difference between the original and the copy becomes almost impossible to spot'. The production of 'simulacra' is identified as one of the manifestations of the postmodern condition. (Harvey, 1992, p289).

economics, ...interest and vitality and a healthy property market' in a number of historic urban environments scattered in Europe and the United States. In physical terms, those places featured buildings and pleasing public spaces which evoked a 'feeling of stability and permanence' (Urban Village Group, 1992, p11). The Group's objective is to emulate all the above attributes in new communities, coined Urban Villages, and combine them with an environmental agenda. Therefore, mixed uses, ensuring local availability of jobs, high densities, regional transport network and pedestrian access are among the definitive attributes of an Urban Village. The 'promoter' of an Urban Village can be a landowner a developer or a partnership. The concept needs to be fed into existing planning mechanisms as a new kind of development. Participation of the existing or the future community to development process is considered crucial.

The physical fabric of an Urban Village is directed by the Infrastructure Code, the Urban Form Code, the Architecture Code, which 'will set the prevailing architectural style', the Public Space Code and the Environmental Action Plan which informs the four Codes with environmental considerations (The Urban Village Group, 1992, p85). In a similar vein with the New Urbanists, there is an apparent preference of the proponents of the Urban Villages to reconstructions of traditional forms, both in the 'architectural character' of the buildings of the Village and in its public spaces (see cover page of this Chapter). Leon Krier's typology[6] of urban spaces and his critical stance towards Modernism is identifiable in the formation of Group's approach.

The spirit of the New Urbanists and the Urban Village Group is fostered by the European Foundation for the Improvement of Living and Working Conditions and is recommended for the future of the European city in its report on *Aesthetics Functionality and Desirability of the Sustainable City* (European Foundation for the Improvement of Living and Working Conditions, 1997)[7]. Also, embracing Leon

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[6] Leon Krier and his brother Rob have been related to the Italian Neo-Rationalists who emerged in the 1950s to develop into a movement in urban design and architecture in the early 1970s. Simply, put, the Neo-Rationalists' central concept is the identification of the essence of the city which reflects its history and corresponds to people's 'collective memory'. The study of 'types', i.e. of elements that cannot be further reduced, elements of a city as well as of an architecture' is the design tool for the Neo-Rationalists. Types are constant archetypal forms but, nevertheless, responsive to time and space (Rossi, 1966). Rossi's typology is reductive, employing types freed from their temporal and circumstantial variations through a rational process. Conversely, Krier tends to imitate types loaded with their temporal and contextual expressions, chosen eclectically. He does however, exhibit a preference to Neo-Classicism.

[7] This publication formed part of a tetralogy entitled *Perceive-Conceive-Achieve The Sustainable City* (European Foundation for the Improvement of Living and Working Conditions, 1997). The tetralogy aimed at exploring issues of urban sustainability in the European context and offering

Krier's typology, the author of this report, Maurice Culot (p52), suggests that the only way to make cities 'desirable' is to return to the 'stylistic approach' and 'the potentially creative concepts of copying, forging to look real, identical reproduction, pastiche, mimicry, imitation'. He regrets that such concepts have been abolished by modern urbanism and are still heavily criticised by European schools of architecture. Focus on the multi-functional pedestrian-friendly neighbourhood as the unit of change is among Culot's recommendations, listed in the end of the report.

The above proposals may create scenic environments visually reminiscent of traditional 'places'. However, they lack some vital characteristics of real communities and, therefore, it is doubtful whether they can work as such. First, they develop instantaneously, under the thrust of the 'promoter' and according to his predominant vision. Second, they lack the social diversity of a real community. Third, they are homogeneous in physical terms, as their buildings adhere to an architectural code that dictates a 'prevailing architectural style' which 'responds to the nature and the character of the locality'.

Furthermore, proposals for neo-traditional neighbourhood developments exhibit, more distinctively, the environmental determinism that was earlier discerned in the compact city cause. In this case, it is expected that self-contained neighbourhoods and neo-traditional architecture will evoke not only fewer and shorter car journeys but also traditional neighbourhood relationships and lifestyles. The proponents of the neighbourhood as the unit of change towards sustainability, have another intellectual problem in common with those of the compact city. Striving to induce a new, or rather reinvent a presumed old, way of living in the city, they propose new physical forms to contain it, rather than new processes to bring it about. This approach disconnects physical forms from social processes, as if the former are only shaped by planning and building regulations which in turn are only a matter of professional expertise. Harvey (1997) identifies the same tendency to focus on spatial forms rather than processes in all utopian proposals as well as in Modernism itself. He points out the irony in the fact that, although New Urbanism suggests itself as the saving alternative to the evils of Modernism, in effect it 'repeats at a fundamental level the same fallacy of the architectural and planning styles it criticises...The movement does

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recommendations for action to national governments and local authorities. It was completed with a fifth volume which attempted to synthesise the previous four and present the city in its global context.

not recognise that the fundamental difficulty of modernism was a persistent habit of privileging spatial forms over social processes'.

Emphasis on the neighbourhood in the urban sustainability discourse is accompanied with a deterministic view of the environment and a nostalgic neo-traditional scenography. Rather than designing the processes and mechanisms to evoke incremental change, proponents of the neighbourhood seek to build places and communities instantaneously, substituting developers' and planning authorities' authoritative plans for the long formative processes that create real 'places'.

3.2.3. Architecture in the Sustainable City

The third level of focus in the search for the sustainable urban form is the individual building. As a large percentage of totally consumed energy is directed at constructing, operating and demolishing buildings, they constitute one of the components of the urban system that requires redefining towards sustainability. Buildings are also major consumers of materials whose manufacture, transport and installation has local and global environmental effects that need to be taken into account.

'Adapting the fabric' is one of the steps towards the *Livable City* suggested by Davidson and MacEwen (1983, pp129-136). Resource conservation is the main objective of the sought-for adaptation. Towards this goal, the authors promote construction of durable buildings, which may require higher initial capital but last longer, require less maintenance and need to be refurbished in longer intervals. Davidson and MacEwen suggest rehabilitation of existing buildings to accommodate contemporary uses, rather than building new. In this way, they maintain, both resources are conserved, as rehabilitation requires less resources than demolition and new construction, and the city's historic character is safeguarded. Retrofitting and designing for energy efficiency and conservation are also necessary. The latter include strategies ranging from more efficient heating plants to passive solar design and increased standards of insulation.

There is little reference, however, to the urban aspects of these principles in physical and social terms e.g. their aesthetic result at the urban scale, the interaction between urban buildings in terms of solar access or wind effects, the processes - social, economic, institutional - that trigger them and the ones that they will give rise to in the urban system. Elkin et al. (1991), Girardet (1994), the *Green Paper for the Environment* (1990) and Nijcamp and Perrels (1994) share the same approach, which

tends to ignore the urban context of buildings and treat them as isolated objects rather than incremental parts of the urban fabric. Ironically, in this respect, the urban sustainability discourse repeats the ignorance of the context that was practised by architects of orthodox Modernism.

Findhorn and Ecolonia are examined as typical expressions of this approach to sustainable urban architecture. Findhorn is a community of about 300 people in North East Scotland, initiated in 1962 and built gradually by the Findhorn Foundation, a charitable trust advocating a 'holistic approach to life' involving self-discovery and spiritual fulfilment in balance with the natural environment. The houses, all detached, are built according to the principles of the German movement *Baubiologie* (building biology) which seeks to integrate building with biology with a view to creating homes that 'meet our physical, biological and spiritual needs and are in harmony with nature' (Pearson, 1989, pp26-27). Passive solar systems have been incorporated in the design of the houses, the 'breathing wall'[8] has been implemented and particular attention has been paid to the toxicity and biodegradability of building materials as well as to the energy input required for, and pollution caused by, their production. An efficient district heating plant provides heating to the houses, and the construction of a wind farm, which will produce much of the village's required energy, is already on the way (Dawson, 1996, pp34-36). In the spirit of the community's commitment to 'holistic life', most houses are self-built by the residents of the village, 'with their hands, with their minds and with their hearts', with a view to familiarising themselves with the process of building, expressing their creativity and strengthening their sense of community (Scimmelschmidt, 1990, pp56-58).

The project of the Findhorn Foundation, although very popular and still expanding in size and improving in terms of environmental technology today, was initiated as a community housed in caravans in 1962. Apparently, at the end of the 1990s, it still holds the anti-urban views of that early period of environmental concern and strives to create an ecological village which caters for a spiritually fulfilling lifestyle, with minimum effects on the environment. Without underestimating its value as a test ground for environmentally sound technologies and products, it must be highlighted that Findhorn, in certain issues, seems to run counter to its goal of natural protection as well as to the broader goal of national and global sustainable development. For

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[8] The 'breathing wall' allowes water vapour to pass through and, at the same time, ensures protection from condensation. It is constructed from untreated timber and is insulated with cellulose fibres (Schimmelschmidt, 1990, Dawson, 1996).

instance, the choice to build detached houses throughout the village ignores the energy benefits of common walls in terraced houses or, even more, in flats. It also ignores the microclimatic benefits of grouping houses together, which would be of particular value in a region with adverse climatic conditions as the Moray Firth in Scotland (Edwards, 1996, pp196-198).

Another shortcoming of the Findhorn experiment, stemming from its smallness of scale and its lack of co-ordination with initiatives taken at other levels, is that the high environmental standards set by the community with regard to building materials could not be met by the British market and, hence, materials often had to be imported from other countries, like Germany or Sweden. This meant that more energy was used for transportation, more pollution was caused and, most probably, higher prices were paid by the community. In addition, the community had to fight to get the 'breathing wall' accepted by the Building Control authorities, as it did not meet the standards regarding vapour protection set by the Scottish Building Regulations (Schimmelschmidt, 1990, pp56-58). Findhorn demonstrates the limitations of an uncoordinated 'bottom-up' approach to sustainability. Not only is it unable to trigger any noticeable change at a larger scale, but it cannot even succeed in its own limited territory, as many factors are exogenous.

What is perhaps the most important shortcoming of Findhorn and of other similar attempts is the message they dissipate with regard to sustainable architecture and sustainability in general. This message is that, in order to live in a way respectful to nature, it is necessary to retire to a distant community, negating urban life and adopting a radically new lifestyle based on a transformed worldview[9]. Furthermore, to build in a sustainable way one has to chase hard-to-find building materials and employ a kind of internationally homogenous 'eco-style', featuring smallness of scale and the necessary glasshouse at the south facade. Indeed, architecture in Findhorn does not learn from local vernacular tradition and its long acquired response to the natural circumstances. Instead, it imports forms and technologies from other contexts. This approach to 'ecological' or 'green' architecture marginalises respect for the environment, reducing it to the motto of yet another architectural style addressed to specific groups of people with a specific interest in natural protection. On the contrary, respect for the environment should be a constant objective of the whole of

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[9] It is indicative of the message Findhorn communicates that the local community of Moray Firth finds it disturbing and feels threatened by, rather than sympathetic to, its current expansion and the culture it represents. A group of villagers has recently initiated a campaign against Findhorn (*The Sunday Times*, 7/4/1996).

the design and construction process of any building, whether urban or rural, with no stylistic preconceptions whatsoever.

Ecolonia, a neighbourhood designed as part of the expansion plan of the Dutch town of Alphen aan den Rijn, is another built project employing architecture as the driving force towards environmental protection. It was built as an experimental ground for practices aiming at energy conservation, life-cycle management and quality improvement in choice and durability (Edwards, 1996, pp194-196). The 100 dwellings that constitute the village employ various strategies towards energy conservation, like high levels of insulation and airtightness. Their performance is monitored and evaluated. They are also constructed with a view to resource conservation and natural protection by using recycled building materials and avoiding tropical hardwood. Finally, Ecolonia is designed to encourage walking, cycling and the use of the regional train network rather than the car.

Ecolonia is different from Findhorn in that it is not an isolated and unco-ordinated initiative of a group of people. Conversely, it forms part of a multi-tier programme, namely the National Environmental Policy Plan, published by the government of the Netherlands in 1989, as a response to the Brundtland Report (WCED, 1987). The National Environmental Policy Plan, 'perhaps the most striking example to date of long range policy making in environmental management' (Carley and Christie, 1992, p249), recognises the need to act at many interlinked levels at the same time. It is, therefore, structured to address environmental problems at the following five levels: the local, the regional, the fluvial, the continental and the global.

Conceived and executed in the framework of this ambitious multi-tier plan, Ecolonia has been successful in evaluating the performance of various energy strategies and, subsequently, informing the Dutch Building Regulations accordingly. Moreover, it has achieved the goal of the National Environmental Policy Plan for 25% reduction in household energy use (Edwards, 1996, p195). In terms of its effective links with other tiers of action and its educating and demonstrative role, Ecolonia seems much more successful, and conducive to wider change, than Findhorn.

It is questionable, however, whether the experiment of Ecolonia has any value in triggering transformation of real urban fabrics towards sustainability. The idea behind its development has not been to create an integrative framework according to which the village could develop incrementally but to actually create specific, individual

experiments on energy efficiency and resource conservation. The fact that Ecolonia's experimental buildings form part of a settlement rather than being scattered in greenfields does not offer much neither to their architectural design nor to their energy strategy. This means that Ecolonia provides information on low energy design and technology for individual buildings, rather than information on how such strategies can be applied at the urban context, how they are affected by it and how in turn they affect the fabric.

Resulting from this approach is the 'air of a demonstration project' (Edwards, 1996, p195) that Ecolonia evokes, rather than that of a real neighbourhood. Arguably, this lack of 'sense of place' also reflects the process with which the buildings were produced. The neighbourhood has been divided into 9 clusters of 10 to 18 houses. Each cluster was designed by one architect and built by one developer. Therefore, in institutional terms as well, the project was not an incremental process but rather a number of individual commissions with a special environmental mandate.

As shown in the previous chapter, viewing the city in a holistic way and acknowledging interactions between urban issues is one of the definitive themes of the discourse of urban sustainability. Nevertheless, within the discourse, urban architecture is not seen as one of the interacting issues and its contribution to the system is not accounted for. There is no account neither of the process that produces the urban building nor of the environmental, economic, social and cultural context of which the building forms part. Each building is seen as a complete object in its own right, rather than an increment of the urban fabric, and as the direct outcome of its regulatory framework, rather than the result of the interaction of many processes. Finally, the impact of buildings on their surrounding fabric and the way the fabric affects them is left unrecorded. In fact, it can be said that, in the context of urban sustainability, there is no essential distinction between rural and urban architecture.

Parallel to this marginalisation of urban architecture from programmes towards urban sustainability, 'sustainable', 'green' or 'ecological' architecture has not given adequate importance to the urban scale. Many issues that emerge at that scale, therefore, are left unexplored. These include:

- constraints that urban densities pose to the pursuit of passive solar design,
- the way urban buildings interact with each other and with public space,
- the way they influence urban microclimates and atmospheric pollutants dispersion patterns,

- the way in which all the aspects of architecture explored for the individual building from design to construction and operation can be implemented for the urban fabric as a whole,
- the way the latter would effect the image of the city and its socio-economic function.

In short, what has not so far been adequately addressed are the mechanisms - social, economic, institutional, as well as purely scientific - that will enable a sustainable mode of building to become the norm rather than the exception and will dictate an urban fabric that will operate featuring collaboration among its incremental parts, rather than competition.

Arguably, this marginalisation of the role of urban architecture in the shift to sustainable urban form is another manifestation of the universalistic nature of the discourse of sustainable cities and its strong Western bias. North American and Western European cities have identified uncontrolled low density expansion as the driving force of their unsustainability. Assuming commonality of problems of the reified city, land use and transport planning have become the issues *par excellence* that can thrust the shift towards sustainability and architecture has assumed an ancillary role, if any at all.

Summarising the above, within the discourse on urban sustainability architecture is often part of the mandate. It is however approached, as producing individual objects of ecological design and not interacting - environmentally, socially and aesthetically - increments of the urban fabric. Also, architectural quality is often subsumed by the plea for energy and resource conservation and replaced by standardised culturally-insensitive 'eco-cliches' legitimated on the grounds of their energy performance.

3.3. What's Wrong with 'Sustainable Urban Forms'

Regardless of the different scale of focus and occasional divergence in views, models and experiments discussed in the last three sections share certain common intellectual problems, manifest with varying intensity. Arguably, these problems reduce considerably the contribution of the search for the sustainable urban form towards real change. They are examined separately in order to increase clarity. In essence, they are closely interrelated. It can even be said that they are different faces of the same problem. Ironically, all three problems were also underlying orthodox modern planning.

3.3.1. Reification of the City

According to the *Dictionary of Marxist Thought* (Bottomore, 1985, pp411-413), the meaning of the Marxist term 'reification' is as follows:

> The act (or result of the act) of transforming human properties, relations and actions into properties, relations and actions of man-produced things which have become independent (and which are imagined as originally independent) of man and govern his life. Also transformation of human beings into thing-like beings which do not behave in a human way but according to the laws of the thing-world.

In the context of this thesis reification is used to denote the tendency of most proposals towards urban sustainability, and more specifically towards sustainable urban form, to view the city as an object with its own intrinsic properties linked to each other by structural relationships. Urban properties are, thus, disconnected from the human processes that bring them about and are treated as independent. Most proposals towards sustainable urban form address these independent, 'thing-like' properties of the city instead of suggesting transformation of their generating human processes.

To begin with, the city is reified in the process of vindicating the cause for the suggested models of sustainable urban form. Specific urban attributes - densities, gasoline consumption, modal split in transport - are isolated, measured and linked with linear causal relationships. The issue that is most hotly debated is the extent of the effects of one attribute to the other. Cities of the world, however, vary enormously in, *inter alia,* size, spatial structure, social structure, culture and economic conditions. Attributes like transport modal split and energy consumption are not independent of all the above. Moreover, their relationship to the above is variable and dynamic and cannot be understood on the grounds of a biological, or any other, metaphor that treats physical attributes as independent from human processes.

Furthermore, the suggested models themselves are a testimony to the reification of the city. In effect, the models are specific physical forms, i.e. the compact city, the self-sufficient neighbourhood and the resourceful building, suggested as conducive to sustainability. This emphasis on physical forms, i.e. symptoms, rather than on the processes that produce them, overlooks the fact that the city is a spatio-temporal rather than a mere physical formation i.e. it exists physically in space and is constantly shaped by processes in time. As Harvey puts it, the city is a *palimpsest* formed by superimposed layers of history (1996, p417).

Focusing on physical forms, while overlooking social processes, is not a problem specific to the sustainability discourse. It is an enduring feature of planning and spatial sciences, in general. Utopias about the city produced by planners and architects have consistently presented revolutionary and elaborate ideas about spatial forms whereas they neglected social structures and economics. Sant'Elia, Scharoun, Taut, Miliutin and later the Archigram group, Friedman, and Soleri exemplify this trend. Le Corbusier's and other Modern masters' visions about the city exhibit the same confidence in the revolutionising social effect of physical space (Meyerson, 1974, pp9-21, Lynch, 1981, pp59-66).

The opposite, however, can also be argued. Traditionally, time has been given more importance than space, in the social sciences. In other words, interpretations of social phenomena commonly emphasise temporal developments reducing space to their non-participating container (Harvey, 1985, Saunders, 1986). Thus, regional differences, competition between different geographical locations, the duality between country and city, the production of the built environment etc. remained for long unexplored. For example, Stretton (1978, p178) highlights the marginalisation of space in socialist theory. As a corollary to this marginalisation, he observes, 'Russian and East European planners faced these questions - housing, urban spatial structure, land-use planning - and others like them, with scarcely any socialist theory to guide them'. Social utopias exemplify neglect of space. Most of 19th century proposals, like those pronounced by Kropotkin, Owen and Fourier had strong elaborate views with regard to social reform, introducing self-governance collective ownership etc., while they left spatial structures largely unresolved or, at least, unrevolutionised (Meyerson, 1974, pp9-21, Lynch, 1981, pp57-58).

Within the sustainable development discourse, David Pearce (1993, pxiv) wonders whether 'researching the idea of the sustainable city is anything other than climbing on a bandwagon' referring to the current popularity of the term sustainability. He thus questions the instrumentality of the urban focus to the pursuit of sustainable development. Seen in the framework of Pearce's reductionist free-market approach to sustainable development, this disregard of the importance of, what is seen as a spatially defined factor, does not come as a surprise. The importance of space is not recognised among the socio-economic researchers of sustainability as much as the importance of socio-economic processes is not adequately acknowledged among planners of 'sustainable cities'.

To conclude, reification of the city is not specific to the current discourse but representative of a traditional gap between social and spatial sciences. Disregard of processes reduces the instrumentality of the discourse to the shift towards sustainability. Simply put, the proposals do not provide a reflexive framework towards incremental change but the physical forms of sought-for conditions. This approach can produce individual trial-and-error experiments of place- and time-bound effect. It is doubtful whether it can facilitate the all-encompassing transformation that the theoretical definition of sustainable development calls for. The intellectual problem examined in the next section is a direct outcome of the reification of the city. Since the city is a 'thing' with intrinsic properties, a universal model of a sustainable city becomes conceivable.

3.3.2. Universality

Urban sustainability, as discussed earlier, is conceived both as an end in itself and as a means towards a global goal, namely towards sustainable development. As Ernest J. Yanarella and Richard S. Levine write, in their *Sustainable Cities Manifesto* (1992, p305):

> The Sustainable City is the Political Archimedian Point for Fostering Change... the ecological city can serve as a working model whose benefits, lessons and consequences can radiate outward, touching more and more features of modern society.

This universal component of urban sustainability, its association with the pursuit of a 'global project', has been crucial in the formation of most proposals towards it. In the previous chapter, it was observed that, the issues considered relevant to urban unsustainability tend to crystallise in a list of universal validity. This chapter attempts to show that, it is not only the issues that have crystallised, but even the physical forms that are suggested as conducive to sustainability. The search for a sustainable urban form becomes the search for the form that addresses a number of urban issues that have been identified by theoreticians and practising planners as wanting redefinition.

At the level of the whole city, the credibility of the compact city and that of decentralised concentration is often discussed with no reference to a specific context. Enwicht (1992) suggests compaction for the Australian city and White for the North American (1994). They address cities that do share similar economic social and cultural backgrounds, have developed according to similar planning frameworks and

in most cases, exhibit similar spatial structures. Conversely, Newman and Kenworthy (1989) suggest it for the cities of the world, Elkin et al. (1990) for the 'city of the developed world' and the European Commission for the 'European city'. In a similar vein, the idea of the neighbourhood is developed simultaneously in both the United States and the United Kingdom and is promoted by the European Foundation for the Improvement of Working and Living Conditions as appropriate, again, for the 'European city'.

The environmental benefits of both models are related to global environmental issues and to the balance of the global ecosystem. This is rooted in the globality of problems, as discussed in Chapter 1, and the equal partaking of all people and nations of the world in the responsibility for the future of the planet. A globally shared identity is also assumed when the non-environmental benefits of the models are propagated. Among the benefits of both suggested models is enhancement of the 'community'. The term is used as a universal constant, harking back to a common pre-industrial past. Nevertheless, the constituents, structure and size of a community are variable and culturally dependent. Besides, the meaning of community is not even necessarily positive and can be associated with oppressive relations and the creation of impenetrable barriers against the excluded class, race, etc. 'Community has always meant different things to different people' (Harvey, 1997). In his critique of New Urbanism, Harvey points out that 'from the very earliest phases of massive urbanisation through industrialisation, "the spirit of community" has been held as an antidote to any threat of social disorder, class war, and revolutionary violence'.

Finally, the universality of the search for the sustainable form is manifested in the three designated scales at which it is pursued. Striving to bridge the theoretical and practical gap between a global goal and local problems, the city is seen as the appropriate scale of focus for pursuing sustainable development. In turn, the spatial form of the city is addressed in the three scales earlier discussed. It can be argued, however, that the scale at which intervention is meaningful and instrumental to change is context specific.

For example, for a city in a developing country suffering from problems emanating primarily from reduced access to resources, focusing on low-energy building design makes an insignificant impact. Conversely, an international treaty regarding fair trade could make a huge one. In the same context, focus on the level of the neighbourhood could be less beneficial than an integrated rural policy at a national level. The latter

could, thwart immigration flows and reduce urban problems of poverty and unemployment. This observation does not intend to denigrate any scale of intervention. On the contrary, it seeks to emphasise the multi-tier nature of the pursuit of sustainability. It also intends to highlight that, although all scales are relevant to all cities, for each case there are one or more scales in which intervention is more meaningful and effective. In other words, the primacy of one scale over another is also context specific.

Besides, the three scales that have gained prevalence in the search for the sustainable urban form are not the only ones in which sustainability can be meaningful. As mentioned earlier, a scale conspicuously missing from the discourse is that of urban architecture, i.e. the scale of focus that reveals the interaction of urban buildings with each other and the opportunities and constraints that this interaction creates. The individual building is studied as a complete object, isolated from its physical, social and aesthetic context.

In conclusion, it should be noted that the models, as well as the scales of focus, promoted in the discourse as impartial and universal, in fact, stem from a particular urban context. They all respond to problems and features of urban form encountered in North America, West Europe and Australia. Thus, at a theoretical level, the discourse repeats the arbitrary universality often exhibited by Modernism in architecture and planning. It promotes models directly derived from the Western context and substantiated in a quasi-scientific, and therefore supposedly impartial, manner - see Newman and Kenworthy - as being responsive to 'intrinsic' urban problems and conducive to universally treasured urban qualities. This Western bias is an obvious contradiction to the idea of equity that is central to the definition of sustainable development. It is also an unrecorded paradox as it is bred in a discourse that has as its mandate to 'address the interests and needs of all countries' and 'strengthen *endogenous* capacity building for sustainable development' (*The Rio Declaration on Environment and Development*, in Quarrie, 1992, p11, my italics).

3.3.3. Environmental Determinism

Bearing in mind the comprehensive - as opposed to strictly environmental - nature of sustainability, the third intellectual problem of the search for the sustainable urban form becomes manifest. The proponents of both the compact city and the self-sufficient neighbourhood promote a spatial form as able not to simply contain sustainable urban living, but to bring about a sustainable society.

The most important environmental benefit of both the compact city and the rediscovered neighbourhood is a projected reduction of energy use and atmospheric pollution by reducing the need for travel. The latter assumes that a specific spatial structure can cause urban populations to change radically and massively their travelling habits. This is a deterministic view of space.

This deterministic view becomes more evident when the non-environmental benefits of the suggested models are considered. Spatial forms are expected, not only to make people use their car less, but also to make them more sociable, closely bound in stable communities and participating actively to the formation of their future. They are promoted as able to counteract well recorded social, economic and cultural processes of overwhelming force like globalisation of economy, increase of unemployment, urban poverty, individualisation, consumerism etc.

The belief that human behaviour can be determined by spatial forms was underlying modern planning and architecture, as well (Harvey, 1997). Rational design and the prospects open by new building technologies could, in the view of orthodox Modernists, promote social equity and welfare. Environmental determinism is also a recurring feature of utopian thinking about the city (Meyerson, 1974, pp9-21). Once more the sustainable cities discourse seems to repeat the mistakes of the planning ideals it strives to replace.

3.4. Concluding Remarks

This chapter reviews critically the search for the sustainable urban form. It presents the principlal tenets of the most salient proposals in the discourse, grouped in three categories according to their level of focus. Subsequently, the chapter identifies underlying assumptions common in proposals focusing on all three levels. The fact that focus for analysis and intervention aiming at urban sustainability has crystallised on the examined three levels is one of the expressions of the universality of the discourse. In turn, the universality is the result of viewing the city as a 'thing' with intrinsic properties rather than the product of human processes. Finally, an outcome of the latter approach to the city is the assumption that the physical environment can determine human behaviour and hence, if appropriately planned, promote a, socially, economically and environmentally, sustainable urban living. Ironically, all three intellectual problems were underlying modern urban planning and architecture which is often blamed for today's urban situation.

The critique developed in this chapter does not intend to denigrate the imperative for a transformation of the urban fabric and the role architecture and urban planning can play towards it. It highlights the need to view the urban fabric as the product of interacting processes, to account for their formative action and to suggest new processes before considering sustainable forms. The next chapter will draft a series of generic steps aimed at facilitating the shift towards a sustainable urban form, rather than designating its attributes. Although the need to address urban form is acknowledged, no specific form is prescribed as universally conducive to sustainability.

chapter fo

CHAPTER 4

TOWARDS 'A THEORY OF SUSTAINABLE CITY FORM'

4.1. Introduction

The urban sustainability discourse has concentrated on three scales of analysis and intervention, and has done so in a universalistic manner, which tended to favour physical forms over processes and to attribute to them deterministic powers on human behaviour.

Two approaches to urban form prove to be valuable in confronting these intellectual problems, although they may lack the integrative and comprehensive nature as well as the global setting of the urban sustainability discourse. They will be examined briefly. Urban architecture, the interaction and cumulative effect of individual urban buildings, is the driving force of *Ecological Urban Growth* (1981) in Ralph Knowles's framework of urban development. His framework can be applied in a flexible manner from the level of regional planning to that of the individual building. It does not designate specific physical forms and it is independent of architectural style. The framework is one-dimensional, as it is produced exclusively by the diurnal and seasonal variations of the movement of the sun, and bound to its North American context. Nevertheless, Knowles has designed a planning process to induce incremental change of the urban form rather than designate the forms themselves. Arguably, the former is a more effective way towards sustainability of urban form that the latter.

Kevin Lynch's *Theory of Good City Form* (1981) is also examined briefly. Lynch attempted to distil the essential elements of urban 'goodness', independent of contextual and temporal parameters, and incorporate them into a normative theory. The theory's emphasis on processes as well as on physical forms becomes the backbone to a series of generic steps that concludes this chapter. This series aims at facilitating gradual transformation of urban form towards sustainability, rather than designating its definitive constituents. It fosters the integrative and comprehensive nature of the concept of sustainability while it confronts the intellectual problems of the concept's urban appropriation.

4.2. Transforming Urban Form: Two Approaches

Two approaches to urban form from the domains of architecture and planning are examined as valuable contributions to the search for a sustainable urban form. The first in a narrow technical manner and the second in a much more comprehensive manner, they both promote an incremental change to urban form, induced through informed processes.

4.2.1. The 'Solar Envelope' as Planning Tool

Ralph Knowles's original concern has not been to conserve energy through urban architecture but 'rather to improve the quality of the urban environment' (1974, pvvi). The *pueblos,* vernacular settlements of the South West of the United States, have been the source of inspiration for the development of his approach. Knowles studies the sophisticated ways in which both the individual dwelling and the fabric of the *pueblos* as a whole responded to their climatic and geographical context. Subsequently, he attempts to translate vernacular sensitivity into a contemporary planning framework responsive to natural processes and constraints.

The point of departure of the produced framework is McHarg's (1969) 'physiographic determinism', i.e. land-use planning responsive to the ecological features of the city region. Knowles's framework, however, develops 'physiographic determinism' further, in order to determine differentiated sizes of increments of urban form, their shape as well as the interactive relationship of increments with each other.

Following his first planning framework, Knowles develops a planning tool to direct urban growth in accordance to 'data based on the sun's movement relative to the location and geometry of the site' (1981). The tool is coined 'solar envelope' and it is a volumetric container constraining development of individual buildings, groups of buildings or blocks, so that surrounding sites will not be shadowed at critical times of the day and year. According to Knowles, the solar envelope will ensure solar access and energy conservation throughout the urban fabric and will generate place-specific forms offering differentiation and character to it. Furthermore, it is hoped to provide urban people with perceptual links with natural processes of which they are deprived in contemporary metropolises and which are essential to their development and quality of life. Influenced by Kevin Lynch's analysis of the urban environment, as developed in the *Image of the City* (1960), Knowles seeks to dictate a city 'richly diversified, yet comprehensible', by introducing natural processes to the process that produces urban architecture. Knowles's tool can be used to direct development of whole regions,

neighbourhoods, urban blocks or individual buildings. It can be beneficial both for infill buildings in already developed areas and for planning new areas from scratch.

In a period when research on exploitation of solar energy by individual buildings was expanding, following the oil crisis in 1973, Knowles shifted interest from the individual building to the urban scale and from the purely technical level to the institutional and regulatory. Moreover, he acknowledged the parallel aesthetic and symbolic benefits of introducing nature into the building process. It is for these significant contributions that Knowles's approach is discussed in this chapter and not as a directly and universally applicable model for urban development.

It should be noted that Knowles's emphasis on the sun's diurnal and seasonal variations and the geometry of the site tends to underrate the temporal constituents of the place and treat it as purely spatial. Besides, despite its scientific and seemingly universal basis, Knowles's framework responds to North American urban problems and stems from the North American social, economic and planning context. Therefore, it is not the actual framework that is endorsed but the following three of its constituent directions:

- The central role of urban architecture for environmentally sustainable urban growth.
- Its parallel role towards urban 'imageability' (Lynch, 1960) and quality of life.
- The treatment of urban buildings as interacting increments of the urban fabric and not as complete objects on their own right.

Finally, what is most valuable in Knowles's framework is the underlying assertion that the sought-for reversal towards a sustainable mode of development cannot possibly be achieved by segregated individual experiments, aspiring to a gradual movement from the bottom-up, but has to be brought forward by informed radical changes to the institutions and laws that initiate and regulate development, i.e. to the process itself rather than its individual products.

4.2.2. *A Theory of Good City Form*

As already mentioned, the current search for sustainable urban form tends to continue the utopian and modernist tradition by searching for physical forms treating them as determinants of human behaviour. By the same token, it tends to assume that the expertise of the planner fed into the planning framework is the exclusive producer of

urban form, rather than the constant interaction of social, economic and, of course, planning processes.

Lynch attempts to bridge this permanent theoretical gap between spatial form and social process in his *Theory of Good City Form* (1981). He divides existing urban form theories into three categories. First, 'planning' or 'decision theories', seek to describe the decision-making process that directs the future of the city. Second, 'functional theories' investigate the way the city emerges and functions. Finally, 'normative' theories' are concerned with defining how the city should be, offering at the same time a complete framework with regard to how it comes about and how it develops[1]. Lynch's theory intends to be 'normative'. He recognises the spatio-temporality of the city and, hence he seeks to develop a theory that addresses both spatial form and human process. He writes (1981, p36):

> City forms, their actual function, and the ideas and values that people attach to them make up a single phenomenon. Therefore, the history of city form cannot be written just by tracing the diffusion of the rectangular grid street pattern. Peking and Chicago are not even superficially alike. Nor can that history be written solely by reference to the impersonal forces of the state and the market. Decisions are cumulative, leaving a strong legacy - valuable or encumbering -for each successive generation of inhabitants.

Although he accepts his sympathetic stance towards the ecosystem metaphor for the city, he does not employ any metaphor to develop his theory. He also resists transposing language or system of analysis from other discursive domains, like most functional theories have done (Lynch, 1981, p98).

Lynch seeks to produce a theory independent of geographical, social and economical circumstances, i.e. a universally valid normative theory for urban form. The product of his effort to distil universally valid elements of urban 'goodness' is neither a spatial structure nor a decision-making process. Instead, it is a set of seven 'performance dimensions'. They are 'those goals which are as general as possible, and thus do not dictate particular physical solutions, and yet whose achievement can be detected and explicitly linked to physical solutions' (1981, p108). Thus, Lynch does not subscribe

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[1] Lynch identifies three normative theories in history of urban planning. The first treats the city as a representation of cosmic order as opposed to chaos. According to such magic models ancient Chinese and Indian cities were designed. The second theory approaches the city as a machine for which the main objective is optimisation of efficiency of flows. This theory is well represented in Modern planning. It was also underlying the planning of Greek colonial cities and Roman military camps. Finally the third is that which uses the metaphor of a city as an organism and to which Lynch himself feels closer, although he pinpoints several shortcomings of the metaphor itself. (Lynch, pp73- 98).

to the fallacy of most proposals towards sustainable urban form, i.e. he resists universalising physical forms emanating from, or responding to, a specific urban context. Nevertheless, it is questionable whether Lynch's elements of 'urban goodness' are indeed value-free and independent of cultural and social context. Instead, they can be argued to stem from socially and culturally specific values, namely those of the North American middle-class[2].

Lynch's seven 'performance dimensions' are listed below (1981, pp121-235):

- 'Vitality' is the dimension which refers to the ability of the city to support the health and biological well-being of its users and the survival of the species.
- 'Sense' refers to the clarity with which the city can be perceived and identified by its users.
- 'Fit' measures the match between the city's 'spatial and temporal pattern' and the behaviour of its inhabitants.
- 'Access' refers to the accessibility of urban uses.
- 'Control' refers to the degree of control users have upon space.
- 'Efficiency' and 'Justice' refer to the cost and equity of distribution respectively of all performance dimensions.

Lynch dismisses all specifications of optimum spatial structure, size or density of a city or a neighbourhood. As Chapter 3 has shown, this is what most proposals towards sustainable urban form tend to do. They suggest sustainable spatial structures, size of settlement, density of development and, in the case of the New Urbanists, even, a sustainable architectural style. In other words, they fail to recognise that 'factors that shape urban form are remote agents while the ones that are directly linked with it, i.e. the local planning agency, are probably the weaker agents (1981, pp40-41). As Lynch observes about models of urban form in general, 'few of them deal with the associated institutional patterns and processes'. As a corollary, 'they are more often static concepts; few include the form of change' (pp285-286).

Urban form theories tend to focus either on processes or on physical forms. For example, the city has been studied as a market place, the ground of class struggle, the container of the community, flows of information or as aggregation of archetypal architectural forms, flows of materials and energy etc. Lynch is quite unique in

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[2] For example, the validity of quantifying 'identity', an element of the dimension of 'sense', and measuring it against a universally valid scale is questionable. So is the validity of the element of 'transparency', another element of the dimension of 'sense', as a universal element of urban 'goodness'.

forging a normative theory that stresses, and hence takes advantage of, the spatial as well as temporal nature of the city. This attempt to reconcile form and process, and not the actual 'performance dimensions', becomes a significant input in the series of steps suggested later in this chapter. Before developing the series, a categorisation of cities is attempted, aimed as a support to the series's four constituent steps.

4.3. Categorisation of Cities

Given the variety of urban environments and the variety of components and processes that constitutes each of them, there are many ways of categorising cities, each comparing different aspects of them. The chosen aspects emanate from, as well as reflect, the scope of the respective categorisation and, often, its preconceived values. They depend on the question posed each time, with regard to cities. Studying specific aspects of the urban system may be a legitimate practice as long as complexity and interdependence of urban processes and components are kept in mind and generalised conclusions, of supposedly universal value, are not inferred.

As already seen in previous chapter, Newman and Kenworthy have categorised 32 cities of the world according to their residential density and energy consumption. Subsequently, they associated high density with low energy consumption and suggested that as a universally valid association and as sound a model of development for the future of the world's cities. Although valuable as a sourcebook, this categorisation cannot initiate the creation of any operational model of action for the categorised cities, as the two researchers have tried to do. The reason is that there is no component of the urban environment that is unaffected by a number of other components and processes Linking eclectically two or three of them with causal relationships is a reductive and arbitrary process; even more so when it is done at a universal level. Categorisation of cities according to their density reduces the city to a 'thing' and isolates it from its temporal dimensions. Its scientific, hence supposedly impartial, nature allowes it to present a model that responds to a specific - basically North American - urban context as universal.

Another example of categorisation of cities is Thomson's 'archetypes' (Thomson, 1977). He studied 30 cities around the world[3], almost all of them with populations of

[3] The 30 cities studied by Thomson, chosen partly by 'chance and convenience' and altogether excluding cities of the then 'communist world' are distributed as following: ten in Europe, nine in North America, seven in Asia, two in Australia, one in South America and one in Africa.

over 2 million people at the time of the research, and identified the following five 'archetypes' relating to their respective transport strategies:

- The 'full motorisation' archetype describes cities mostly in the United States, like Los Angeles and Detroit, that have prioritised automobile traffic and practically have no physically recognisable, or functionally significant, centre.
- The 'weak centre' archetype describes the decentralised city organised in suburban centres, exemplified by some European cities like Stockholm and some provincial cities in the United States and Australia, e.g. Melbourne.
- The 'strong centre' archetype describes most European cities and New York.
- The 'low cost' archetype refers to cities in the developing world.
- The 'traffic limitation' archetype groups together the rare cases from both the developed and the developing world that have consistently tried to limit automobile traffic, encouraging public and non-motorised transport instead, examples being Stockholm and Singapore.

The outcome of the above categorisation is identification of common approaches to the transport problem which is seen as universal. It does not aim at recommending solutions but rather at demonstrating the choices. It is interesting to note that Thomson abandons his spatial structure based categorisation for a cost-based one, when he deals with cities of the developing world. In these cases, he writes 'the difficulties are not so much technical or economic as political and social' (Thomson, 1977, p320). Finally, his last 'archetype' groups together cities regardless of cost or spatial structure, focusing instead on the common feature of strong state policies in the field of urban transport. Therefore, in this categorisation, cities are not grouped according to one aspect. Cities of each 'archetype' have a different aspect of their system in common: the one, be it physical, socio-economic or political, that is identified by Thomson as being the most significant for the operation of the cities' transport.

Stretton (1978, pp93-95), in a review of planning practices of cities of the world, ponders upon the inadequacy of sampling different practices, on one hand and the dangers of generalising, on the other. The former, he writes, would leave the causes of differences unrecorded while the latter could conceal differences across cities grouped in the same category. His review compromises by identifying four broad categories, based on a combination of political and economic criteria, within which Stretton samples variant individual expressions. He categorises cities of the world as follows:

- 'Poor capitalist' cities like Bangkok, where urban policies are weak and usually transposed from Western urban contexts, to which their governments aspire. Housing and land policies are the most pressing problems.
- 'Poor communist' cities like Pnon Penh in Cambodia and Havana in Cuba which have managed high standards in housing, produced by strong centralised urban policies. Repetitive and characterless blocks and basic amenities are the physical manifestations of these policies.
- 'Rich communist' cities like those in Hungary and Russia where public investment has consistently shown a rural and industrial bias, aiming at containing urbanisation. Huge programmes of mass-produced public housing are the norm in these countries.
- 'Rich capitalist' cities in North American, Europe and Australia with varying degrees of planning control reflected in different spatial structures, from the North American *laissez-faire* to the British containment policies and New Towns.

Stretton's categorisation illuminates once again the absurdity of inferring universal conclusions by comparing isolated physical attributes of different cities. It also demonstrates the futility of searching for models of spatial forms to direct urban growth universally. Stretton identifies specific physical forms as materialisations of social aspirations of respective regimes and economies. For example, mass produced anonymous public housing offering minimum comfort is linked to socialist aspirations for equality and communal life in poor communist countries (Stretton, 1978, p130). North American suburbia, and the extensive network of roads servicing it, is seen as the spatial reflection, as well as further promotion, of race- and income-based inequalities (Stretton, 1978, pp149-151). Thus, Stretton does not treat the city as a 'thing' but as the outcome of economic and political processes. However, he does not overlook its spatial nature, either. Stretton emphasises the importance of 'good physical design'. 'Technical mistakes with large social consequences are not really as rare as people think' (1978, p175). He thus highlights the interdependence of economic conditions, political regimes and physical solutions.

Finally, Peter Hall (1984, pp247-250), categorises cities of the world according to their stage in their urbanisation process. He recognises five stages of development in urban evolution (see figure 4.1.).

- During the first stage the 'primate city' attracts massive immigration from the countryside, and experiences 'absolute centralisation'. At the same time, smaller urban systems in the region attract rural populations while losing people who

move to the primate city, i.e. they experience 'centralisation during loss'. Many cities in the developing world, Hall writes, are in the first stage of 'urban evolution' or in the second.

- During the second stage the primate city still grows and begins to suburbanise ('relative centralisation') while smaller urban centres experience 'absolute centralisation'. Cities in the Newly Industrialised Countries (Korea, Mexico etc.) are either in this stage of evolution or in the third.

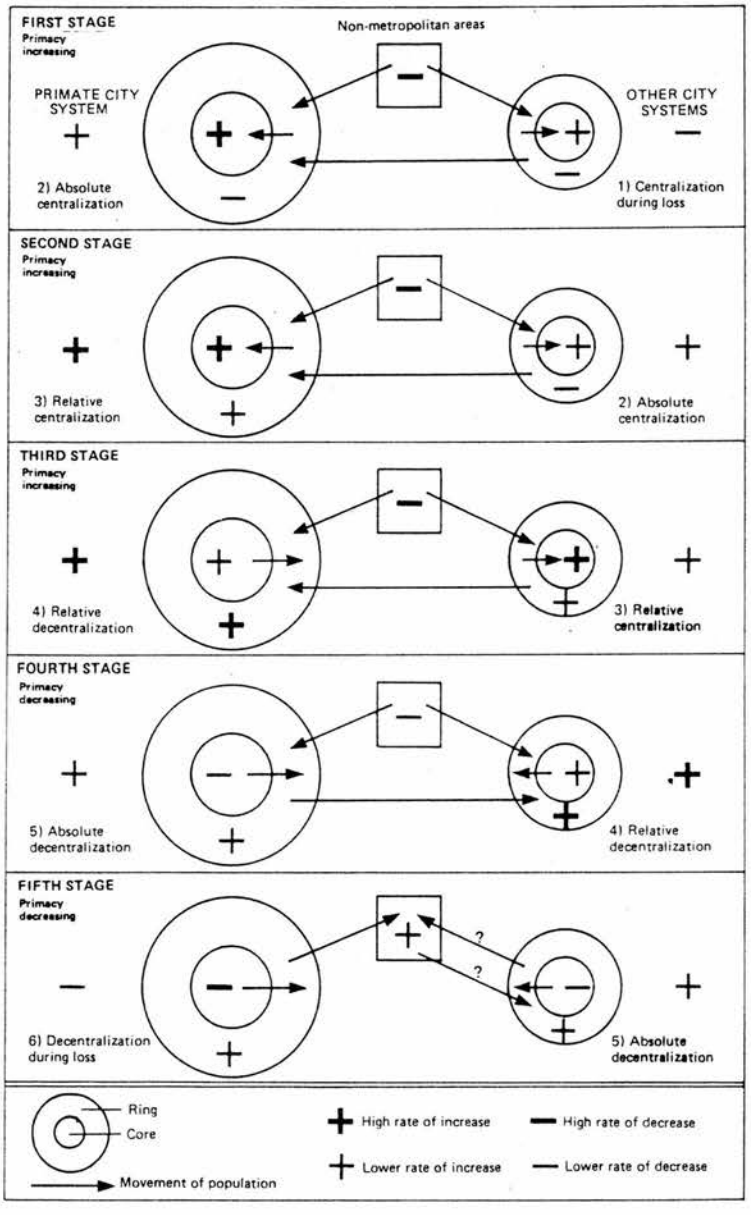

Figure 4.1. Categorisation of cities according to their stage of development (Hall, 1984, p248)

- In the third stage, smaller cities begin to expand beyond their central core. The primate city, at this stage, experiences faster growth in its suburbs than in its core ('relative decentralisation').
- In the fourth stage, the primate city experiences decline in its central core population while its suburbs continue to grow ('absolute decentralisation'). Smaller cities continue to suburbanise. Most cities in Western, Northern and Central Europe have been in this stage since the 1970s.
- Finally, in the fifth stage, the central cores of smaller cities begin to decline while the primate city experiences stagnation or decline in its total population. Cities in the United States of America and the United Kingdom are the only ones that have so far reached this stage, according to Hall.

In fact, the above categorisation is based on the pattern of urbanisation experienced by advanced industrialised countries and it is questionable whether it can anticipate patterns of development and spatial structures in cities of the world, in general. This categorisation is an example of an 'evolutionary urban theory'. The validity of such theories has been challenged by the study of urban environments outside the Western context (Leontidou, 1990, p11). Hall's categorisation is examined in the context of this thesis for its emphasis on the interaction between the temporal and spatial dimension of cities.

4.3.1. Faces of Unsustainability

Drawing heavily from all the above categorisations, this section attempts to categorise cities according to the driving forces of their unsustainability. The assertion underlying this categorisation is that unsustainability, and therefore sustainability, does not have one, universally valid meaning and is not driven by the same forces in every city. Therefore, cities are not grouped according to one constant aspect of their complex systems. Each group has different aspects in common, which are not one or two measurable attributes or processes but an empirically formulated aggregate of many physical attributes and non-physical processes dubbed 'unsustainability'. The scope of this kind of categorisation is not simply comparative but instructive at the strategic level. Highlighting commonalities as well as differences in processes and forms, it serves as a springboard for the series of principles towards urban sustainability, presented in the next section. Aware of both generalisations and omissions, a working categorisation of cities according to the driving forces of their unsustainability is as follows:

- North American and Australian cities

- Western European cities
- Eastern European / Ex-communist cities
- Mediterranean European cities
- Cities in the developing world.

Following is a brief account of the driving forces of urban unsustainability in each category.

North American and Australian Cities. They belong to Stretton's 'rich capitalist' group and, with some exceptions, to Thomson's 'full motorisation' archetype. Most proposals towards urban sustainability respond to physical attributes of cities of this group and tend to generalise inappropriately.

Generally speaking, urbanisation in North America was concomitant to industrialisation and, at present, is at, what Hall terms, its fifth stage. During this stage the population of the 'primate urban system' declines while smaller urban systems continue to suburbanise and experience decline in their central cores (Hall, 1984, p249).

Production of the built environment in cities of this group obeys the basic functional rules of capitalism. 'Capital accumulation' and reproduction of existing social structures are its utmost goals and market dynamics is the most efficient way to pursue them (Harvey, 1985). Translated into urban policy, the latter leads to weak planning control of urban development. Prioritising economic efficiency means that environment and social considerations are secondary. Some of the cities in this group still practice, what Stretton calls, 'free trade' urbanisation, which means there is minimal state control of private investors' choices. Most, however, are 'regulated private markets' which means that the state designates land uses and development rights of different areas, which are subsequently developed privately. State urban improvement programmes[4] are driven by the same rules of 'capital accumulation' and 'reproduction of power' and tend to accentuate rather than alleviate social inequalities.

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[4] Stretton (1978, pp151-156) refers to two programmes of the federal government of the USA to illustrate how they exacerbated rather than improve the living conditions of the urban poor. The first, dubbed Urban Renewal, was launched in 1949 and was a massive slum clearance programme. Cleared sites, formerly occupied by the poor, were sold cheaply to private developers to build new housing and offices. In most cases, former residents were not re-housed, while the developers, the city council and the new residents benefited. The second programme, Model Cities, aimed at creating a few demonstration projects, focusing on the scale of the city neighbourhood. Certain neighbourhoods benefited from such projects, often by depriving other areas from funds, but there was no general practice established.

In terms of urban form, the above combination of political, economic and institutional processes is manifest in extensive low-density sprawl of detached suburban houses, segregated land uses, absent or weak centres. Whole city density in Detroit is 14 people per Hectare and in Melbourne is 16, which are very low compared to Vienna with 72 people per Hectare and Paris with 48 (Newman and Kenworthy, 1981, pp42). This spatial form is notorious, within the sustainable cities discourse, *inter alia* for encouraging frequent and long automobile journeys and hence contributing to local and global pollution and depletion of non-renewable resources. It is also more expensive to service in terms of infrastructure and wasteful in terms of land. Last, but not least, this spatial structure reflects, accommodates and encourages sharp social segregation.

Another unsustainable feature of cities of this group is the consumerist, energy-intensive and car-dependent lifestyles of their inhabitants. This is manifest in North Americans holding world records in energy and water consumption, domestic waste and CO_2 production as well as automobile ownership. With $2000m^3$ per capita annual consumption of water, compared to $150m^3$ in Switzerland, North American cities draw water from sources further and further away from their territory, causing disruption to distant ecosystems and lowering underground water tables (Haugthon and Hunter, 1994, p166).

The unsustainability of North American cities is primarily demonstrated in their record contribution to global environmental problems. The degradation of the immediate physical and social environments, felt mostly by the urban poor, and the ecological disruption of their extensive local hinterlands are also tangible testimonies to it.

West European Cities. They are also 'rich capitalist cities' in Stretton's terms, and, to a lesser degree, share the consumerist lifestyles and market driven urbanisation of the previous group. The process of urbanisation in West Europe has also been similar, albeit prior, to that in North America. The well documented process of rapid urbanisation as concomitant to industrialisation has been geographically specific to West Europe and North America and does not necessarily pertain to other cities of the world. Despite the above similarities, in the context of urban sustainability, West European cities present a different case.

First, generally speaking, the capitalist *laissez-faire* approach to urban development, that has created North American cities, has been mitigated in West Europe by rigorous urban planning policies. Indeed, modern urban planning itself can be said to have been born in West Europe in response to 19th Century urban squalor. Urban policies in Western Europe, on the one hand, have constrained urban invasion on the countryside more effectively than in North America, and, on the other, have directed urban growth in a more balanced and hierarchical way at the regional level.

Second, in Thomson's categorisation, most cities in this group belong to the 'strong centre archetype'. They are developed in densities treble those of North American and Australian cities, and have physically pronounced and functionally significant centres.

In terms of urban form, post-war planning ideologies have encouraged segregated land-uses as a means of increasing efficiency of traffic flows and resulted, generally speaking, in strong centres and low density mono-functional suburbs. In many cases, global processes of economic restructuring left old industrial cities with problems in their social fabric, physically expressed in inner-city problems and the need for regeneration. At the same time, increasingly market-driven deregulated urban policy resulted in out-of-town commercial and office developments and further decline of urban cores. Decline in public transport and growing dependence on automobile resulting in congestion, global and local pollution is the growing outcome of all the above.

The above were accompanied by social segregation, though not at the degree exhibited in North American ghettos. Social inequalities expressed spatially resulted typically in the poor experiencing the lowest environmental quality and the lowest mobility. In general, the same rule of accentuating, rather than addressing, social inequality through spatial planning is encountered.

Finally, consumerist lifestyles, emulating those of the North Americans, are among the driving forces of unsustainability of Western European cities. On the whole, the unsustainability of cities in this group lies in their contribution to local and global environmental problems and the unequal distribution of local environmental degradation across their fabric. Their difference from cities in the previous group is not only a matter of degree of environmental and social effects. It is also a matter of different cultural and political contexts, planning traditions and physical urban forms.

East European / Ex-Communist cities. Dilemmas with regard to urban spatial structure have been similar in capitalist and communist countries. The primacy of economic development among governmental goals has also been the same. However, the results are strikingly different in physical and social terms.

> ...salient features are the location of housing close to or even within city centres, the very modest quality shopping centres, the absence of commercial advertising and the ostentation of public squares, government and cultural buildings. The slums or ghettos of the type found in large capitalist cities may be absent. Another conspicuous absence at least until late in our period was the virtual absence of the private car, with its attendant paraphernalia of roads and traffic furnishing (Ravetz, 1980, pp315-316).

Investment on heavy industry, in pursuit of economic growth, has been a priority in communist countries. Industrialisation, however, did not lead to the levels of urbanisation experienced by countries of advanced capitalism as decentralisation of settlements and industries has been a strong objective of communist governments. This is currently reflected in lower rates of urbanisation of an average of approximately 57% in Eastern Europe, compared to an average of 80% in Western Europe (UN, 1985). Nevertheless, it is important to note that cities in ex-communist Eastern European countries are still growing and are likely to continue to grow under the new political and economic conditions. It is problems of growth that are facing these cities rather than of decline.

Many of the models, currently suggested by the proponents of different sustainable forms, have been among the rudimentary objectives of many communist societies. For example, decentralisation and concurrent development of small communities, self-sufficient in terms of food and work have been common pursuits in communist countries (Silvan, 1992, p83). So was the reconciliation of the contradiction between city and country. Policies towards these goals, however, did not render cities in communist countries sustainable. Among the reasons of their unsustainability has been the coercive nature of many of the policies which contained urban growth, which is contradictory to the definition of social sustainability.

Old technology heavy industry generated heavy levels of pollution of the air, land and waters which was not limited to the cities' local hinterland, but had transboundary effects e.g. acidification of forests, polluted Danube etc. Electric power plants are still a major source of atmospheric pollution as they burn Eastern Europe's abundant reserves of lignite (brown coal) which produces high levels of sulphur dioxide and ash

(Eurostat, 1995, p214, Carter and Turnock, 1993, p4). Untreated urban sewage is another major polluter.

Unlike most 'poor' and 'rich capitalist cities', 'poor' and 'rich communist' cities do not face the acute problem of homelessness. As part of the socialist ideal, communist governments have executed huge housing programmes and have been much more successful at providing solid housing to the masses than capitalist governments of poor countries have been. Nevertheless, housing and the built environment in general has been conceived as a 'consumption good' rather that 'production asset' (Stretton, 1978 and Ravetz, 1980) and, therefore, they were built to cover very basic needs only. Undifferentiated, characterless modernist style was employed to reflect social equality, and space provisions for privacy were kept to a minimum with a view to encouraging a communitarian way of living. Climatic and other regional differences were not accounted for in the design of the typical high rise unit which was repeated endlessly without any consideration for the intermediate public spaces.

Cities in this group demonstrate eloquently the contingency of the concept of sustainability, not only on the physical, social, cultural, economic and political context, but also on the factor of time. At present, these cities are faced with problems that are related both to the inherited physical and non-physical characteristics of the past regime and to the challenges of their introduction to the market-driven and globally operating one[5]. In sharp contrast with previous groups, it is not energy- and resource-intensive consumerism, that defines unsustainability but rather reduced access to resources due to economic crisis and, yet, degraded immediate environment.

Mediterranean European Cities. This group comprises cities in Portugal, Spain, Italy, and Greece. Although, studies of the 'European city' have tended to assume commonality of problems across Europe, cities in these countries present a distinct group with common features in their process of urbanisation, their spatial forms and social distribution patterns. Hence, they present a different face of unsustainability from cities in Western and Northern Europe, as well as from those in Eastern Europe. Demarcating their uniqueness and understanding them as a different group is currently

[5] An example of the problems of transition is the increase of homelessness in Russia and other Eastern European countries. This is a result of housing reforms based on privatisation of formerly state-owned housing, introduced by post-socialist governments (Andrusz, 1996, pp23-29).

essential, as the European Union, to which European Mediterranean cities belong, attempts to forge guidelines for an integrated urban policy across Europe[6].

In Stretton's categorisation, cities of this group are difficult to classify. Although capitalist, they did not follow the process of urbanisation of either of Stretton's 'rich' or 'poor capitalist' cities. They present the distinct case of the 'semi-periphery' situated between the 'core' of Western Europe and North America and the 'periphery' represented by the countries of the developing world (Leontidou, 1990). In terms of urban policies, this intermediate position is manifested in a heterogeneity of approaches which range from 'the municipal socialism of Bologna to the free-market or unplanned urban market in the cities of Portugal and Greece' [Wynn (ed.), 1984].

In terms of spatial structure, Mediterranean cities, like most cities of West Europe, belong to the 'strong centre archetype'. Indeed, Thomson examines Athens under this heading, along with Paris, Tokyo, New York, Toronto, Sydney and Hamburg. He recognises, however, the uniqueness of this city when he observes that 'the developed nations of the West and the developing countries of the East meet in Athens' (1978, p207).

According to Hall's five stages of urban evolution, cities in this group are in their third or fourth stage (Hall, 1977, p247-250). In these stages primate cities continue to grow and suburbanise while secondary cities also begin to expand beyond their central cores. The fourth stage represents the beginning of decline for the central core of the primate city. Cities of Western Europe have been in this fourth stage of 'absolute decentralisation' (Hall, 1977, p250) since the early 1970s, a decade in which primate cities in Southern Europe, like Barcelona and Athens, were still experiencing growth, both in their core and their periphery. Besides, suburbanisation in Southern Europe never reached the levels, or assumed the spatial form and social meaning, it did in the West.

Generally speaking, industrialisation in Southern Europe started later than in the West and North and was not the sole cause for urbanisation to occur. 'Industry followed rather than created urban concentrations in sharp contrast to the case of Northern Europe' (Leontidou, 1990, p31). In mid-19th century, 20% of the population of the United Kingdom was already living in cities of more than 100,000 people, while in

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[6] *The Green Paper for the Urban Environment* (1990) has been the first attempt towards an integrated European urban policy, followed by the *Aalborg Charter for European Sustainable Cities* (1993) etc.

Italy, which was the most urbanised country in Southern Europe, this percentage was 5% [Wynn (ed.), 1984, pp1-4]. Urban planning also started much later than in the West and did not arise as a conscious response to urban industrial blight, as it did for instance in the United Kingdom, but it was often dictated by disasters like fires and earthquakes[7]. Consequently, Southern Europe has contributed very little to the planning tradition of Western Europe[8] although its official planning policy has been influenced by planning in the West. Conversely, in practice, cities in this group have not been affected by the principles of orthodox modern planning as their respective official plans failed to be executed. As Wynn [Wynn (ed.), 1984, p207] observes in the concluding chapter of an overview of urban planning in Southern Europe:

> Planning in South Europe has been plagued by a range of quasi-legal and blatantly illegal activities undertaken by both public and private agencies, resulting in a lack of public confidence in the system as a whole.

It is not, therefore, adequate to explain the uniqueness of Mediterranean cities on the grounds of their different stage of evolution. 'With great insensitivity, ...urban phenomena which recur in Greece and all over the semi-peripheral world are usually considered as residual, culturally specific, even traditional or 'precapitalist', destined to converge, sooner or later, with Western patterns' (Leontidou, 1990, p5). Instead, these 'urban phenomena' can be seen as a different way of urban growth, a very prominent feature of which is what Leontidou calls 'informality' and what Wynn refers to as 'illegal activities'. The latter have created extensive areas of unauthorised building around most Mediterranean cities, and have also left pronounced imprints on individual buildings within them. Unauthorised settlements in Mediterranean European cities are distinctly different from those in cities in the developing world, not only in their being more solid constructions, but also in occupying legally owned land. It is the use of land for housing that is illegal and not its occupation.

Compaction and high mixture of land uses are two more features encountered across cities of Mediterranean Europe, which differentiate them from their West European counterparts. Although these features are, at present, promoted as valid steps towards urban sustainability (see Chapter 3), in cities of this group, they are often causes of

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[7] Lisbon's plan, for example, was created only after an earthquake destroyed the city centre almost completely in 1755. The case of Thessaloniki, also extensively damaged in 1917, will be examined in Chapter 5.

[8] The Linear City proposed by Spanish Arturo Soria y Mata in 1883 and practised partly for the extension of Madrid is maybe the only contribution of Southern Europe in modern urban planning tradition (see Tafuri and Dal Co, 1980, pp46-47).

problems. Green spaces are very limited, centres are heavily congested and polluted and industrial zones are often neighbouring residential areas.

Social segregation in space is also less notable than in cities of Western Europe or North America, and follows different patterns. In contrast to the Anglo-American pattern of poor centres and rich suburbs, Mediterranean European cities feature concentrations of high income populations in the centre and low income in the periphery. Different classes often coexist in the same urban area while some social differentiation occurs vertically, i.e. lower income families normally occupy lower storeys and higher income ones occupy the upper storeys of the same apartment block. Usually, only the very rich are isolated (Leontidou, 1990, pp10-14).

In part, the unsustainability of the European Mediterranean urban form can be said to be constituted by the very spatial features that are promoted as sustainable within the urban sustainability discourse. Compaction reduces opportunities for traffic management and green space, and exacerbates atmospheric pollution. High mixture of land-uses is often detrimental. Lack or ineffectiveness of official planning, rather than ideological adherence to modernist functionalism, is among the driving forces of this group's unsustainability. Finally, consumerism and increasing dependence on the automobile are this group's common features with the 'rich capitalist' cities.

Cities in the Developing World. This group comprises the largest and fastest-growing cities in the world. It is important to note that, they are not grouped together on the basis of their stage towards the supposedly universal goal of Western-style industrial development and the equivalent levels of economic growth and standards of living. Nor are these cities grouped together on the basis of commonalities in their urban form, policy or lifestyle. In fact, this would be impossible given the fact that this group comprises cities of strikingly different form, social structure, history and culture.

In the context of this categorisation, the common feature of these cities is the international setting of their unsustainability. More accurately, the driving forces of these cities' unsustainable development are causally linked more to their nations' dispossessed position into the international power order than to their urban policies or individual lifestyles. The significance of international relations to the unsustainability of cities in the developing world is the basis on which they are grouped together.

Judged according to a number of socially-insensitive and technical sustainability indicators these cities would appear to be sustainable, for example in terms of per capita energy consumption, production of CO_2, production of waste, use of non-motorised modes of transport, recycling of waste and building materials etc.[9] Representing the exact opposite of the North American city, the unsustainability of cities of the developing world is mostly related to the physical and social conditions of the immediate environment and less to the cities' contribution to the degradation of their local hinterland and to global environmental crisis. Ironically, the driving forces of their unsustainability, both historically and at present, are more a matter of global setting than of local or national policies.

The process of urbanisation in countries of the developing world has also been more related to international developments than to immigration thrust by industrialisation. In many countries, colonialism has played an important role both in causing expansion of specific, previously small, settlements and in determining their spatial form. It can be said to have triggered the first wave of immigration to the cities of the developing world. However, the greatest impact of international relations on the urbanisation pattern of the developing countries was post-colonial. In the 1950s and 1960s, the 'urban bias' of international aid, combined with severe environmental degradation in rural areas, manifested in shortages of natural resources, water and productive land, created a new wave of country-to-city immigrants. These country-to-city immigrants are often referred to as 'ecological refugees' (Guha and Martinez-Alier, 1997, p4, Elliott, 1994). A significant transformation in urbanisation of developing countries occurred in the early 1970s, with the emergence of the globalisation of the economy and the New International Division of Labour (NIDL). Spurred by increasing costs of labour and natural resources in the developed world and by the possibilities of separating management from production offered by new communication technologies, multinational corporations started locating their production plants in developing countries, mostly in urban areas. The latter offered cheap labour in huge quantities that could guarantee both its constant availability and its low price. Environmental controls were also less stringent or non-existent. The NIDL and the resultant relocation of multinational production plants caused a new wave of immigration from the countryside (Drakakis-Smith, 1987, p11-28). Therefore, the assumed

[9] In a typically Western-centred manner, practices like recycling waste by children and the poor have been romanticised by commentators on urban sustainability. These commentators, thus, isolate an apparently 'sustainable' practice from the social and economic circumstances that engender it (see Girardet, 1992, p98). They present another example of the reification of the city within the sustainable cities discourse.

concomitance between urbanisation and industrialisation is not valid in the context of the city of the developing world, where 'penetration of capitalism' has been the major drive to urbanise (Leontidou, 1990).

Still rural in its vast majority, populations of the developing world continue to inundate cities in search of a better life. Basic requirements of shelter, water and sanitation cannot be met for the incoming populations, resulting in increased morbidity and mortality. Shanty towns occupy the fringes of the city with the lowest environmental quality, raising issues of social equity apart from those of health and environmental sustainability. Although car ownership is very limited and confined to the rich members of the society, streets are congested and values of specific atmospheric pollutants of local effect, like suspended particulates and sulphur oxides, particularly harmful to human health, are high. This is because the car fleet is old and badly maintained, the fuel used is of low quality, the road network is poor and traffic management inadequate. There are practically no environmental controls and comprehensive environmental policies in action as they are considered costly and a hindrance to the development process[10].

Notwithstanding the immediacy and urgency of the problems, their solutions, just like their causes are not exclusively local. On the contrary, they are primarily a matter of transforming international trade and aid policies. At the same time, they are also a matter of developing national, regional and urban policies that stem for specific economic and social contexts rather than emulate Western models.

Simplifying for the sake of clarity, the principle driving forces of unsustainability of cities of the developing world can be reduced to the following four:

- Lack of basic resources and infrastructure for the bulk of the urban population.
- Deteriorating environmental quality of the immediate urban environment with immediate effects on people's health, notably that of the poor.
- Western-biased framework of international trade, aid and environmental policy.
- The 'urban bias' of international and national investment, further impoverishing the country and attracting more populations to big cities that cannot cater for their basic needs.

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[10] see Elliott, 1994, Drakakis-Smith, 1987, Hardoy, et al., 1992, etc.

The above categorisation does not intend either to offer a comprehensive view of current environmental, social and economic problems of the world's cities, nor to suggest solutions. It aims at highlighting that, although it can be confidently said that most cities are not sustainable, according to the current definition of the term, the constituents of their unsustainability vary dramatically. It is understood that even within each category, there are huge divergences. This is obvious in the variety of spatial forms for example West or East European cities exhibit as well as in the variety of cultural and social systems and economic conditions of cities of the developing world. However, there are a few principle common forces that constitute the face of unsustainability of each group and make the categorisation meaningful.

Finally, there are cities that could not be classified comfortably under any of the five categories. **Chinese cities** are a prominent example. The combination of many environmentally-friendly features of their operation with the coercive nature of many of the policies that sustain them and the current challenge of the shift of the communist government towards open market mechanisms make cities of China a distinct category.

The above categorisation of cities of the world according to the driving forces of their unsustainability helps to illuminate the following point. There is a universal scope in the plea for urban sustainability. This, however, does not lie either in the commonality of urban problems across the world or, to be sure, in the possibility of a common solution. The rest of this chapter is an attempt to distill the constituents of a genuinely universal scope for urban sustainability.

4.4. Looking with 'Less Habitual Eyes'

'To know how the cities' problems and policies vary in such diverse conditions may not contribute much to planners' detailed skills, but it may help them to see their own cities with less habitual eyes and sometimes, perhaps, to think and plan more imaginatively for them' (Stretton, 1978, p3).

Looking at cities with 'less habitual eyes' is the prerequisite of pursuing urban sustainability. It is also, as previous chapters have tried to show, what the current discourse on urban sustainability has failed to achieve, repeating vital intellectual mistakes of the past in its theoretical and practical expressions.

The four generic steps suggested ahead intend to provide a conceptual apparatus for this new look at urban issues, with a view to sustainability. They also intend:

- to respond to recurring intellectual mistakes of urban planning,
- to be independent from, but sensitive to, context and time,
- to be instructive to the development of sustainable urban physical forms,
- but not prescriptive of any specific physical forms.

Within the framework of the suggested series, many existing tools of environmental research and policy are re-evaluated, maybe modified and employed. For example, the ecosystem metaphor is challenged as the overriding framework for urban studies, linking physical and social processes. It is, however, valued as an instrument for comprehensive understanding of physical urban flows like materials, energy, transport flows etc.

Although they are separated for the sake of clarity, the objective of all four steps is the same. They seek to facilitate a gradual and incremental transformation of urban form towards sustainability, taking the spatio-temporality of each urban context as its point of departure. The four generic steps towards sustainable urban form are:

- contextuality
- appropriateness of scale
- reconciliation of form and process, and
- reflexivity.

4.4.1. Contextuality

The first generic principle intends to respond to the universality of the discourse of urban sustainability. It refers to the need to identify the driving forces of unsustainability of each city in order to initiate the process of addressing them.

Contextuality does not imply ignorance of scientific findings or methodological tools. Nor does it imply isolation from efforts towards sustainability with a wider scope like regional programmes or international treaties. On the contrary, a programme towards urban sustainability needs to be integrated with the latter not only to ensure that it is instrumental towards regional, national and global sustainability, but also to ensure its effectiveness in its own limited territory. This is so, because cities are increasingly open systems and are affected by processes operating at higher levels, most notably the global.

A programme towards a sustainable city needs to reconcile this paradox: to address specific problems within a specific spatio-temporal context which is however affected by processes - physical, economic and social - operating globally and manifest in the city's social and physical fabric. Maintaining operational links with action at higher levels is a way to internalise these processes to the programme.

Notwithstanding being part of a global economy and a global ecosystem, each city has its own combination of spatio-temporal forces of unsustainability. The categorisation offered in the previous section, crude as it may be, illuminates the variety of such combinations. The irrelevance of the *Green Paper for the Urban Environment* (CEC, 1990) to South European cities is a testimony to the need for contextuality as well as to the futility of searching commonalities of form. The suggested categorisation also helps recognise that common environmental problems between different cities are often related to common socio-economic and political circumstances. For example, high levels of sulphur dioxide in the atmosphere of ex-communist cities are related to their governments' commitment to self-sufficiency and the corollary extensive use of local lignite (Carter and Turnock, 1993, p4).

The principle of contextuality asks for the specificity of each city to be identified and used as a point of departure for any programme towards sustainability. At the same time, it recognises the need for the latter to be set in a context of global economic and environmental processes and identify its relative position. Therefore, it is not a contextuality of exclusion and relativism, but one of inclusion through networking, that it is required.

4.4.2. Appropriateness of Scale

The second principle responds to the exclusivity of scales in which the discourse of urban sustainability has approached urban form. This exclusivity is another expression of the Western bias of the discourse as well as one reducing its instrumentality to change. In response to these problems, the second principle suggests identification of the scale at which the driving forces of unsustainability operate as an important step towards addressing them. In other words, its seeks to identify the scale or scales at which intervention towards sustainability will be most instrumental in each urban context. In that sense, it forms a further sophistication of the principle of contextuality. It aims at increasing further the sensitivity of the suggested conceptual apparatus to specificity.

The attributes and processes identified in the previous section as the driving forces of a city's unsustainability may not be operating within its own physical territory or may not be possible to deal with the city's administrative powers. River pollution caused by pesticides used in agriculture, is an example of the first case and decline of the city's industrial base caused by international economic developments is an example of the second. Driving forces may be related mainly to the way national or international policy or economy operates. Or they may be related to the operation of the whole city as a system and its relation to its hinterland. Or they may be attributes of one component of the system and its relation to the rest of the system.

There is not a single meaningful scale of analysis and intervention in each city and co-ordination between action in different scales is vital. However, one scale maybe crucial for addressing problems of urban form of one city while being irrelevant to another. Moreover, designation of certain scales as universally meaningful for intervention towards sustainability of urban form may obscure the significance of other scales to specific cities. The importance of the neglected scale of 'urban configurations' for the modern Greek city, that will be examined later in this thesis, is paradigmatic in this respect.

4.4.3. Reconciliation of Form and Process

In the context of this principle, the word process denotes the totality of social, economic and institutional factors that shape the physical urban fabric. It refers to the temporal characteristics of city that influence the development of, and are reflected on, its physical characteristics.

This third generic principle responds to the reification of the city in the urban sustainability discourse as well as to the underlying belief of the latter in the deterministic effects on space. It refers to the need to identify the spatio-temporality of the city as opposed to its mere physicality. It also refers to the need to identify that the city is not a 'thing' but the outcome of a process called urbanisation (Harvey, 1996b, pp38-61).

Notwithstanding the comprehensive nature of the concept of sustainable development and its appropriation at the urban level, the perceived - by planners and 'urbanists' in general - detachment of space from the human processes that produce it is sustained. So is the belief in the possibility of social reform through spatial restructuring (see Chapter 3).

Geographers have been among the first to recognise this lasting gap between social and spatial interpretations of the city and attempt to address it. Harvey (1985) introduces spatiality into the Marxist theory in order to build a Marxist interpretation of the process of urbanisation. He does not seek to negate the theory, but rather to enrich it with an account of spatiality. Historical materialism is, thus, transformed into historical-geographical materialism. In his latest book, *Nature Justice and the Geography of Difference* (1997), Harvey continues, in the same vein, to argue that the division between natural and social sciences is artificial as there can be no intervention on nature or physical space in general that is devoid of social objectives as well as consequences (Harvey, 1996, pp182-193). He condemns the 'Utopianism of fixed spatial form' of 'high modernism', of utopian thinking about the city and of the contemporary return to communitarianism, as exemplified by the New Urbanists (see Chapter 3).

> The antidote to such spatial determinism is not to abandon all talk about the city (or even the possibility of Utopia) as a whole, as is the penchant of postmodernist critique, but to return to the level of urbanization processes as being fundamental to the construction of the things that contain them (Harvey, 1996, p419).

Another geographer, Edward Soja (1989, 1996) 'reasserts space in critical theory' and introduces it as the third element - added to time and society - in any interpretation of human life. Using these three elements - 'historicality', 'sociality' and 'spatiality' - Soja (1996) explores 'real and imagined' spaces left unrecorded by Modernist interpretations and discovered by 'marginal' discourses like feminism, racism, postcolonialism etc. Arguing for restructuring of all established binaries and for adopting a new perspective between them - between modernism and postmodernism, materialism and idealism, society and history etc. - Soja introduces the idea of 'Thirdspace'. This is the space occupied by a 'third', 'combinatorial perspective', formerly obscured by strict definitions of opposites, different disciplines etc. and hence unexplored. In Soja's terms, the 'third' argued for in this principle is situated between physical form and human process.

The integrative and comprehensive nature of the concept of urban sustainability forms an appropriate ground on which to bridge the traditional gap between social and spatial sciences. Thus, the reconciliation of form and process could move beyond the discursive level to inform urban policy towards sustainability. Informed urban policy would acknowledge the spatiality of society and the social dimension of space.

The third definitive principle of the suggested conceptual apparatus views urban form, not as a purely spatial formation, but as the outcome of social, economic and institutional processes. It seeks to identify unsustainable spatial structures and link them to the processes that produce and reproduce them. In turn, informed by contextuality and focusing on the appropriate scale, a framework towards sustainable urban form will seek to decipher the relationship between form and process and redesign it towards sustainability.

4.4.4. Reflexivity

The last definitive principle of the conceptual apparatus towards sustainable urban form refers to the need for any framework to contain the means of its own transformation, in response to transformations in the urban context its seeks to address. In other words, it refers to the need for a framework towards sustainability to be sensitive to changes in time.

The concept of reflexivity was introduced by Ulrich Beck (1986) to distinguish late modernisation and its concomitant 'society of risk' from industrial modernisation and its principle concern with 'making nature useful or with releasing mankind from traditional constraints' (Beck, 1986, p19). In view of ecological, medical, psychological and social risks, modernisation, Beck argues, becomes concerned with problems that emanate from its own development. 'Modernisation is becoming reflexive; it is becoming its own theme'. Beck (1986, pp183-236) suggests that, within the 'risk society', existing politics, basically practised by professional politicians, have become inadequate and obsolete. He calls for a 'new kind' of 'differential politics' that will be capable of 'self-criticism' as it will be practised by a broad spectrum of sectors of the society.

From a slightly different line of thought, Anthony Giddens (1990, pp36-54) presents reflexivity as inherent to Modernity, and one of the three sources of its dynamism[11]. He uses the concept to support the view that current philosophical and cultural developments are not manifestations of a new condition, called postmodernity, but of 'modernity coming to understand itself' i.e. they are expressions of the reflexive nature of modernity.

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[11] The other two sources of dynamism of modernity are 'the separation of time and space' and 'the development of disembedding mechanisms' referring to the possibility of social relationships detached from specific places.

The sustainable cities discourse is an expression of the reflexive nature of late modernity, in the sense that it addresses urban issues that have come about, or have exacerbated, as a result of the process of modernisation itself. Nevertheless, it has not so far suggested the means to respond to the dynamic nature and unpredictability of the 'risk society'. Apart from the 'demystification of science' in the 'risk society' (see Chapter 1), the discourse has failed to recognise the 'transformation of politics' (Beck, 1986, pp183-235). The focus of the discourse on physical processes and spatial forms has led it to neglect the ways that urban sustainability can be made possible. In other words, the discourse has sought for policy instruments rather than transformed political processes. Reflexivity requires that a framework toward sustainability 'becomes its own theme' i.e. contains the mechanisms to challenge its own tools and operational processes.

There are certain characteristics of ecological and human socio-economic processes that make it necessary for any framework that hopes to have a transformative effect on them to be reflexive i.e. to contain the means to transform itself. The concept of sustainability itself and its definitive reference to social and environmental objectives is where the necessity for reflexivity stems from.

First, ecological systems, be it the biosphere, a wetland or the city, for that matter, are not stable but dynamic. Environmental problems, challenging the sustainability of systems or their components as a result of human intervention, are not fixed and predictable. 'Uncertainty' is one of the concepts introduced to environmentalism by the sustainability discourse, referring to limited scientific knowledge of ecosystems and of the long-term effects of human intervention. A policy framework towards sustainability that does not change itself in response to changes in the ecosystems it refers to, will soon be ineffective.

Second, apart from being dynamic and unpredictable in nature, environmental problems transcend established scientific and administrative boundaries, demanding unprecedented alliances between different levels and sectors of the administration and different sectors of society. This is so, not only because they are composite, but also because they tend to change scale of reference. A problem that was originally perceived as local can be transformed into a regional or transboundary one, requiring communication between local, regional and international bodies. A framework that cannot facilitate the necessary links will impose preconceived - disciplinary and

administrative - boundaries to problems and hence fail to address them in their entirety.

Third, socio-economic processes, arguably lying at the root of, both strictly environmental and social, unsustainable features as well as containing the seeds of their solution, are also dynamic. A framework towards sustainability, apart from investigating socio-economic processes in order to understand their relation to unsustainability, i.e. apart from identifying urban spatio-temporality, should be able to respond to their changing trends. In the opposite case, 'last year's tools and goals will be used to fight next year's issues in a dynamic situation that more and more requires proactive rather than remedial action' (Harvey, 1996, p429). Globalisation of the economy and the dramatic development in telecommunications' technology are dynamic processes with a strong bearing on urban issues, already physically manifest in urban form.

Recent approaches to environmental management, at various levels of administration, have tried to introduce methods to update and test the efficiency of their tools, mainly addressing the first of the above characteristics, i.e. the dynamic nature of environmental problems. Sustainability Indicators, Environmental Audits and methods of evaluating the built environment can be seen as instruments aimed to inform constantly the process towards sustainability with regard to changes in the physical and, in some cases, non-physical environment. This should help, not only to update policies and their targets in response to changing environmental trends but, also, to check the effectiveness of the policies themselves. Notwithstanding their potential value in this respect, these increasingly acclaimed tools of environmental management, do not in themselves induce reflexivity, as they do not inform the framework with regard to its own intrinsic flaws. They can, at best, induce change of policy tools and targets but not transformation of the operational framework of environmental management itself.

To conclude, the pursuit of the dynamic and multi-faceted goal of sustainability requires that, it is not only policy instruments that are reconsidered but the operational principles of existing politics themselves.

4.5. Concluding Remarks

The temporal nature of the city needs not to be proven to social scientists[12]. Nor does the importance of space to planners. The urban sustainability discourse is mostly developed by planners and hence its tendency to privilege spatiality to human processes.

Nevertheless, lines of thought, instrumental at addressing the intellectual problems of the discourse are traced in publications, of urban design and planning and, most notably geography, that have highlighted spatial as well as temporal attributes of urban form. This chapter has drawn from these lines of thought, external to the urban sustainability discourse, to draft a series of principles towards a sustainable urban form.

The four principles intend to define a new conceptual apparatus towards sustainable cities, independent of specific spatio-temporal contexts. Their function is not linear and exclusive but cyclical and relational, meaning that the last principle leads back to the first and all are related to each other and cannot be pursued in isolation.

The second part of this thesis will operationalise this conceptual apparatus on the specific context of the city of Thessaloniki with a view to initiating the process of its transformation towards sustainability.

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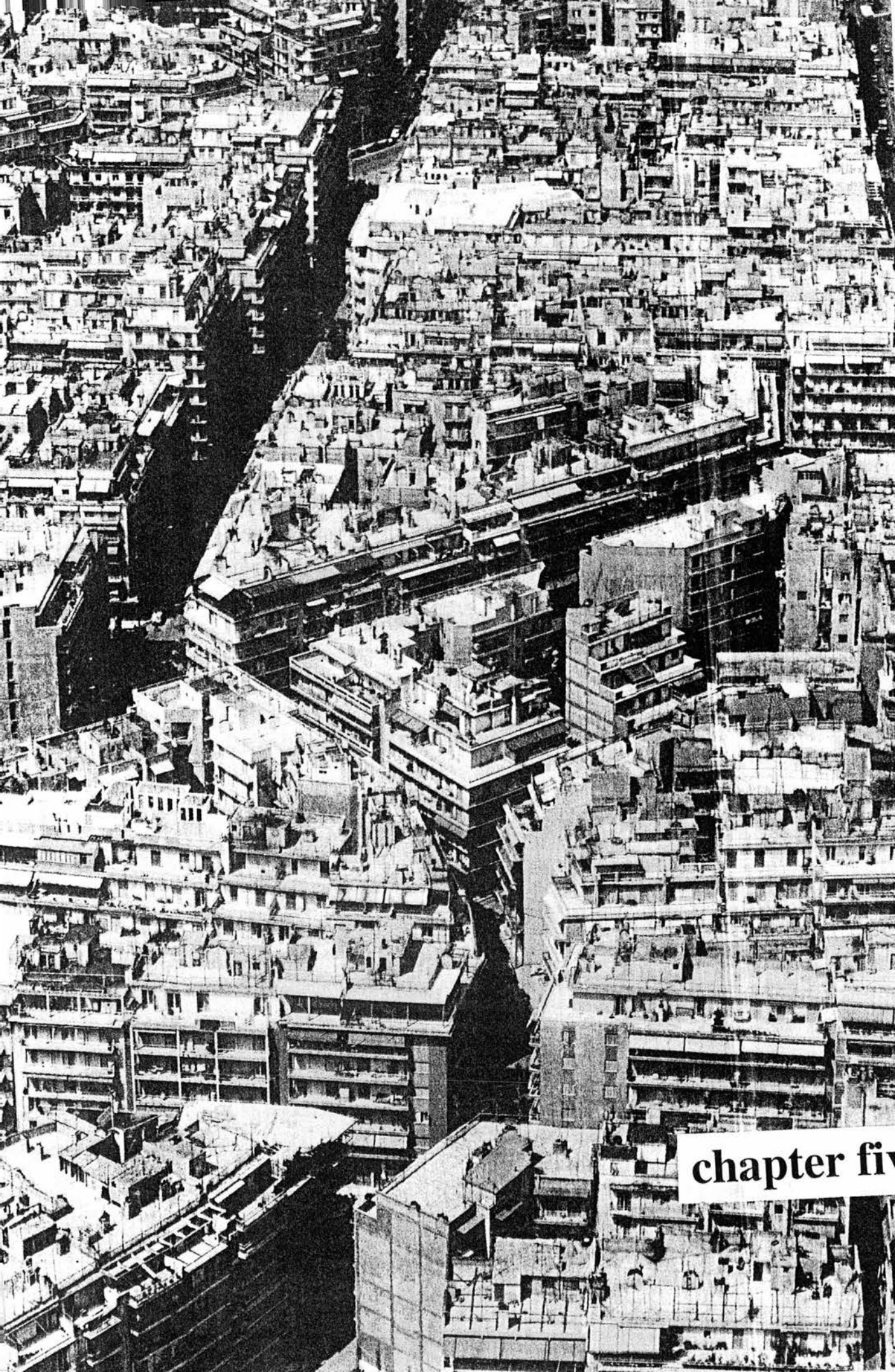
[12] See Saunders,1986, etc.

PART II



chapter fiv

CHAPTER 5

CONTEXTUALITY: IDENTIFYING THE DRIVING FORCES OF UNSUSTAINABILITY

5.1. Introduction

Chapter 5 presents an overview of Thessaloniki's physical environment, and of the planning framework that directs and controls it. This is done in accordance the first generic step towards urban sustainability, suggested in the previous chapter, namely contextuality.

The first part of this chapter is based on the metaphor of the city as an ecosystem in order to describe the physical environment of Thessaloniki and its current operation. As mentioned earlier, biological metaphors have been often used to describe the city. Originally suggested as an alternative to the mechanistic view of the city fostered by Modern Movement in urban planning, these metaphors are at present a central assertion of the discourse on urban sustainability. The metaphor of the ecosystem, or that of the organism, is often suggested as the overriding concept capable of encompassing the totality of physical and non-physical urban issues and disclosing teleologically solutions. Instead, this chapter, employs the metaphor of the ecosystem as an instrument of environmental assessment, in a strictly physical sense. In other words, the metaphor is seen as able to disclose a number of measurable physical dysfunctions, but unable either to illuminate their causes and effects or to indicate solutions. Employing the metaphor, the energy flows and materials' cycle of Thessaloniki are examined and the threats they pose to the immediate, surrounding and global environment assessed. The physical fabric, built and open space, of the city is examined as a component of the ecosystem.

Subsequently, the biological metaphor is abandoned, as inadequate to account for attempts to direct the city's development and disclose their respective and cumulative impact. There is continuity and predictability in the operation of an ecosystem that is irrelevant to the complex, spatio-temporal nature of the urban environment. The second part of Chapter 5 looks at Thessaloniki as an 'object of planning' i.e. it presents an overview of past and present proposals regarding the city's future. Both are assessed with regard to their relevance to the urban context in question.

Chapter 5 concludes by identifying the driving forces of the city's unsustainability inferred both from trends of its physical environmental qualities and from those of its planning framework. It is a central point of this chapter that the latter have been not consistently sensitive to the former.


ALBANIA
MACED
GREECE
Thessaloniki
Athinai
(Athens)
Aegean
Sea
Ionian
Sea
Kríti
(Crete)
Cyclades
Dodekánisos
Marmara
Denizi
Istanbul
Izmir
Lesvos
Khios
Samos
Rodhos
Kárpathos
Kásos
Kithira
Anáfi
Thira
Milos
Kalamai
Pátrai
Argos
Korinthos
Piraeus
Khalkis
Lárisa
Vólos
Kastoria
Kozani
Edirne
Gallipoli
Çanakkale
Balikesir
Bandirma
Mitilini
Skiros
Sporádhes
Voriai
Évvoia
Andros
Kikládhes
Paros
Naxos
Kea
Ikaria
Limnos
Samothráki
Thásos
Kavalla
Xánthi
Komotini
Alexandroúpolis
Khaniá
Iráklion
Réthimnon
Ioánnina
Igoumenitsa
Kérkira
Corfu
Levkás
Kefallinía
Zákinthos
Pílos
Kiparissía
Mesolóngion
Trikala
Kardhítsa
Olímbos
2911
Pindhos Oros
Vlorë
Durrës
Tiranë
Shkodër
Titov Veles
Kep-i-Rodonit
Lecce
Brindisi
C. Sta. Maria di Leuca
Otranto
Strait of
Lülebürgaz
Tekirdağ
Ayvalık
Akhisa
Manisa
Söke
Milâs
Bodrum
Didim
Aydın
Büyük Menderes
Edremit
Burs
Khíos
Pátraikos
Korinthos
Idhra
Spetsai
Mílos
Thira
Anáfi
Kithira
Khaniá
Iráklion
Réthimnon
Ida
2460
Oros
Kríti
(Crete)
Musala
2925
Pirin Planina
Rhodope Mts
Athos
2033
Gökçeada
(Imroz)
Lésvos
Khíos
Sámos
Ikaria
Paros
Naxos
Kea
Idhra
Spetsai
Mílos
Thira
Anáfi
Kithira
Kríti
(Crete)
Kárpathos
Kásos
Rhodos
Dodekánisos
(Dodecanese)
Cyclades
Kikládhes
Évvoia
Euboea
Andros
Tínos
Ikaria
Limnos
Samothráki
Thásos
Gökçeada
(Imroz)
Lésvos
Khíos
Sámos
Rhodos
Kárpathos
Kásos
Kithira
Anáfi
Thira
Milos
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(Crete)
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2460
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Milos

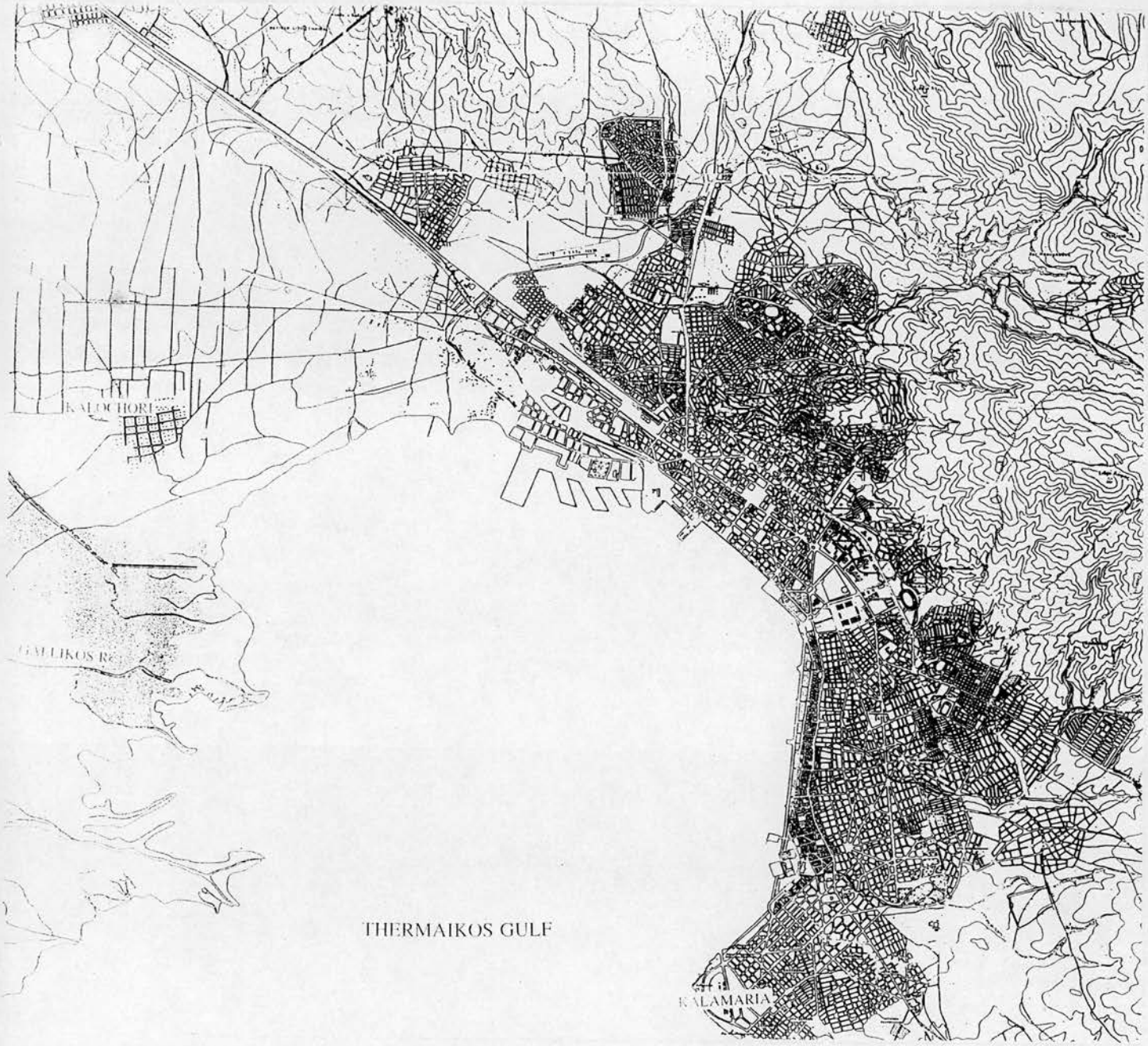

Figure 5.2. Map of the city of Thessaloniki

Ramsar Convention. Greece, as a Contracting Party of this Convention, is responsible to designate the exact boundaries of each of 11 wetlands in the country and protect them with specific national laws. These laws, however, are still pending for all, but one, of the protected wetlands many of which are threatened by development plans. The Axios-Aliakmon-Loudias Delta is also protected by European Directive 79/409 and the Convention of Barcelona. However, a publicly funded land reclamation scheme has already reduced its size and disrupted its ecological balance (Ministry of the Environment et al., p106, 1995, OECD, 1983, p101).

The city lies on the 40th North parallel and enjoys a Mediterranean climate with an annual mean air temperature of 15.5^0 Celsius, ranging from an average absolute minimum of -3^0 in February to an average absolute maximum of 36^0 in July (1983-1991). Prevailing winds are North and Northeast during the winter and West and Southwest, coming from the sea, during the summer[2]. An average 415.6mm of precipitation is spread in a total of 106 days (1981-1990) (NSSG, 1994, p27).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1981	3.3	6.5	12.1	14.4	17.8	24.7	25.1	25	22.2	18.6	8.9	9.1
1982	5.5	4.8	9	12	18.5	23.6	24.9	24.9	22.8	18	9.8	8.2
1983	6.8	5.3	10.4	16	21.2	21.6	26.1	24.3	20.9	14.9	10.6	7.2
1984	6.9	7.3	8.6	12	19.3	22.9	24.4	23.9	22.9	19.1	12	7.2
1985	5.9	3.7	8.9	16.2	21.4	24.1	26.6	27.1	22.4	14.9	12.1	9.2
1986	7	7.2	9.9	15.4	18.7	23.3	24.5	26.2	21.7	15.8	9.9	4.8
1987	5.4	8.3	5.4	13.3	17.2	23.5	27.2	24.9	24	15.5	10.7	8.2
1988	7.9	7.7	9.5	13.2	19.3	24.2	28.2	26.3	22.2	15.7	6.8	5.5
1989	5.6	8.4	11.8	16.2	18	22.4	25.1	25.3	21.7	15.2	10.6	5.9
1990	5.1	8.9	12.8	15.2	18.8	23.6	26.6	25.3	21	16.4	12.9	7.7
1991	4.8	5.6	10.8	13.5	17.1	24.3	25	25.1	21.2	16.9	12.5	
1992	6.2	6.3	10.2	14.6	17.7	23.4	24.9	26.9	21.1	17.2	11.9	6.4
1993	5.6	4.8	8.8	14.4	18.9	23.9	25	25.7	21.6	18.6	9.5	9.3
Mean	5.8	6.5	8.8	14.3	18.7	23.4	25.6	25.4	21.9	16.6	10.6	7.3

Table 5.1. Monthly average temperatures in Thessaloniki and their means for the period 1981-1993.

There are 749,048 people (census 1991) living in the conurbation of Thessaloniki, belonging administratively to 12 Municipalities and 3 Communes[3]. What is legally referred to as Greater Thessaloniki Area (GTA) comprises, in addition, one municipality and 51 communes which have strong links to the main urban core. The Greater Thessaloniki Area has a population of approximately one million people.

At present, 59% of the population of Greece is urban. This rate of urbanisation is still considerably lower than the European average which is over 70%. The distribution of

[2] Data about air temperature and wind in Thessaloniki were provided by the Department of Meteorology and Climatology, School of Geology, Aristotle University of Thessaloniki.
[3] Commune is the smallest administrative unit in Greece.

urban population in the country is quite unbalanced with more than half of it living in Athens, 12% in Thessaloniki, 9% in four cities with populations between 170,000 and 100,000 and the rest in smaller cities (NSSG, 1994, pp34-43).

The most intense period of urbanisation for Thessaloniki was between 1961 and 1971 when its population almost doubled[4]. During the 1970s, while cities in Western, Northern and Central Europe were already experiencing decline in their central populations and positive growth in their suburbs, Thessaloniki, being the 'primate city system' of its region, was still receiving people in its core while expanding in its outer rings. According to Hall's categorisation of 'stages of urban evolution', in the 1970s Thessaloniki shifted to a period of 'relative decentralisation' (Hall, 1984, pp246-50), although this pattern of urbanisation had neither the same drives nor the same spatial manifestations as in the advanced industrialised cities of Europe.

At present, the city can be said to be entering the fourth stage of its evolution, dubbed by Hall 'absolute decentralisation', which represents a weakening of the central core and shift of its population to the city's suburbs. The population of the conurbation has increased by 6%, between 1981 and 1991. This is a slow rate of growth, if compared to that of the 1960s Within the conurbation of Thessaloniki, Municipality of Thessaloniki is the central, biggest and most densely populated (406,413 inhabitants, census 1991). Although still the biggest in the conurbation, the population of the Municipality of Thessaloniki, has decreased for the first time by 5.5% between 1981 and 1991. Most Municipalities and Communes of the city have either remained stable or shown significant increase of their populations. For instance, the Commune of Panorama, which has attracted high-income households in detached houses, increased its population by 145% since 1981, and the Municipality of Kalamaria experienced over 56% increase at the same period (census 1991, NSSG, 1994, p39). It should be noted, however, that Thessaloniki's decentralisation is expressed in different urban forms and social distribution patterns than those of the equivalent trend in North and West Europe and North America.

5.2.2. Energy

Greece is among the lowest consumers of energy in Europe. However, it is also one of three member-states of the European Union - Ireland and Portugal being the other

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[4] From 1961 to 1971 the population of Thessaloniki rose from 380,654 to 557,360 people (47%): an unprecedented rate of growth and one that has not been repeated todate (Andrikopoulou-Kafkala et al., 1979, p59)

two - who are still increasing the energy intensity of their economies, i.e. the energy embodied per unit of Gross Domestic Product. This is attributable to the fact that these three member-states are still going through a phase of industrialisation and urbanisation (Nijkamp et al., 1994, p105). Increase of energy intensity of Greece's economy demonstrates the inadequacy of individual 'hard scientific' indicators like energy consumption alone to give meaningful information with regard to any country's progress towards sustainability. The latter is illustrated further by the following.

Country	Hard coal	Lignite	Crude oil	Natural gas	Nuclear energy	Primary electricity	Other fuels	Total energy
EC 12	**14.5**	**4.9**	**43.9**	**20.5**	**14.3**	**1.4**	**0.5**	**100.0**
Belgium	15.6	0.2	42.0	19.4	21.3	0.4	1.1	100.0
Denmark	39.2	0.0	46.5	12.0	0.0	2.1	0.2	100.0
Germany	15.4	14.4	40.2	17.9	11.3	0.5	0.3	100.0
Greece	**4.3**	**32.3**	**61.6**	**0.4**	**0.0**	**1.2**	**0.2**	**100.0**
Spain	18.9	2.8	52.4	6.6	16.2	2.6	0.5	100.0
France	6.4	0.3	39.6	13.2	40.0	0.3	0.2	100.0
Ireland	19.0	11.9	47.0	21.3	0.0	0.6	0.2	100.0
Italy	6.7	0.1	58.4	28.7	0.0	4.5	1.6	100.0
Luxembourg	27.0	0.0	49.8	12.7	0.0	9.2	1.3	100.0
The Netherlands	11.8	0.0	36.3	48.8	1.4	1.3	0.4	100.0
Portugal	19.6	0.0	75.1	0.0	0.0	4.4	0.9	100.0
United Kingdom	24.0	0.0	38.5	27.1	9.4	0.9	0.1	100.0

Table 5.2. Proportion of different sources of primary energy in inland consumption in 1993 (Eurostat, 1995b, p219).

Energy production in Greece is highly dependent on imported oil products. In 1993, 61.6% of the total energy consumption was derived from crude oil and oil products, and this was the highest percentage of oil consumption in the EU for that year, excluding Portugal (see table 5.2., Eurostat, 1995b, p219). Although, it is true that Greece has improved substantially its degree of energy self-sufficiency in recent years, this indicator is still 21% below the European Union average (EC, 1995a, p76). Besides, this improvement was achieved by exploiting local lignite reserves, the use of which for electricity production has strong environmental impacts, in terms of local and global atmospheric pollution.

The main objective of the national energy policy is to increase the country's self-sufficiency by utilising local renewable and non-renewable sources and by increasing efficiency in production, distribution and consumption. This objective is pursued at a national level only, while possibilities for energy planning and management at an urban or regional level are very limited as a result of a centralised energy production system and a limited and unclear role of the local authorities (Nijkamp et al., 1994, p93).

Electricity is produced, transported and distributed by the Public Power Corporation (PPC). The biggest part of electricity is produced from local lignite - in 1994 lignite power plants covered 78% of total power produced in the country. Power plants using oil and hydropower cover a small percentage of the total demand for electricity (Tzelepis, 1995). Average per capita electricity consumption in Thessaloniki is higher than that of Greece in total and this is due to the high rate of industrialisation in the area. The last two decades average electric energy demand in the city has been increasing at a rate of over 5% per annum.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Thessaloniki	848	825	901	939	964	969	965	1,037	1,106	1,163
Athens	2,071	2,046	2,229	2,318	2,449	2,457	2,644	2,496	2,478	2,433
Greece	6,232	6,134	6,763	6,996	7,448	7,451	7,860	7,832	7,752	7,680
Thessaloniki % total Greece	13.6	13.4	13.3	13.4	12.9	13.0	12.2	13.2	14.2	15.1
Athens % total Greece	33.2	33.3	32.9	33.1	32.9	32.9	33.6	31.8	32.0	31.6

Table 5.3. Consumption of oil products in Thessaloniki, Athens and Greece in 1000s of metric tons between 1985 and 1994 (source Ministry of Industry, Energy and Technology, Directorate of Oil Policy)

Demand for oil products is also rising continuously, mainly because of increasing numbers of cars circulating in the city as well as increasing demand for heating, cooling, electric appliances etc., representing improved standards of life. In 1994, average per capita consumption of oil products in Thessaloniki, mostly used for heating and transport, was 1.162 tonnes. This was well above the national average of 0.75 tonnes per capita, for the same year. Between 1985 and 1994, a period not very

intense in terms of industrial development in the area, consumption of oil products in the city increased with an average rate of over 3% annually[5] (see table 5.3.).

In fact, industry has reduced its share of the final energy consumption in the country from 34% in 1984 to 27% in 1992. Transport has increased its share from 39% to 43% in the same period and so have domestic and commercial uses (NSSG, 1994, p87). Currently, there are more than 350,000 vehicles in Thessaloniki. This number is rising annually and is expected to almost double by the year 2010 (Nikolaou, 1995). These trends illuminate the need for integrated transport and energy policy as well as the need to reduce energy requirements for heating, lighting and cooling of the country's building stock as well as those of future developments.

The introduction of natural gas, piped from Russia and shipped from Algeria, in the near future[6], is hoped to reduce Greece's dependence on oil products to 50% and increase the limited energy choices currently existing in the country. Natural gas will be used mainly for electricity production (41.5%) and industry (32.5%). It is expected to reduce levels of pollution in urban centres [Public Gas Corporation, undated, (a) and (b)].

Atmospheric Pollution

Atmospheric pollution is examined as a by-product of Thessaloniki's energy flows. However, its high levels prove to be contingent also on certain features of the physical fabric of the city as well as to its climate.

Greek national legislation related to air quality is comprised in the *Environmental Protection Act* (1650/86) which is a framework law dealing with environmental protection, in general, and transposing all relevant EU Directives in the national law system. The relevant EU Legislation comprises limit and guide values for concentrations of several pollutants in the atmosphere (sulphur dioxide, lead, suspended particulates, nitrogen oxide) and directives for establishment of comprehensive monitoring among member-states of ozone concentrations and of CO_2 and other greenhouse gases emissions. In 1993, a European Council Directive called all member-states to introduce mechanisms aiming at the stabilisation of emissions of CO_2 at the levels of the year 1990 by the year 2000 as well as to monitor CO_2 and

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[5] Data provided by the Department of Oil Policy, the Ministry of Industry, Energy and Technology.
[6] Natural gas was programmed to be put into use in the beginning of 1996.

other greenhouse gases[7]. Greece, Belgium and Portugal, are the only Member States that are currently beginning only to identify measures towards this target, while the rest have either implemented specific measures or have articulated proposals which await implementation (EU Committee of the American Chamber of Commerce in Belgium, 1994). Furthermore, the European Union Legislation calls for reduction of emissions of nitrogen oxides (NOx), sulphur oxides (SOx), particulates and Volatile Organic Compounds (VOC) from industrial plants[8].

One of the objectives set by the *Environmental Protection Act* (Law 1650/1989) was the establishment of a comprehensive national network of stations for monitoring levels of pollution in the country. This target has not yet been accomplished at an urban level, let alone the national. At present, at the Greater Thessaloniki Area, monitoring of emissions of pollutants is carried out by 11 stations in total. These belong to Environmental Departments of five different authorities, namely to the Municipality of Thessaloniki, the Ministry of Macedonia and Thrace, the Aristotle University of Thessaloniki, the Greek Fuels and Oils Company and an Association of the Local Authorities adjacent to the main industrial areas of Thessaloniki. The fact that so many authorities have introduced atmospheric pollution in their agendas can be seen as a sign of increasing environmental awareness. It results, however, in overlapping and unclear responsibilities and lack of co-ordination.

The legally responsible authority for measuring pollution and planning its abatement is the *Organisation for the Master Plan and Environmental Protection* which at the moment does not own any monitoring stations but overviews and analyses data provided by other authorities. Yet, it is still not possible to form a reliable image of the condition of the atmosphere in the city because measuring stations belonging to different bodies are not calibrated in the same manner, and are not rationally spaced into the city. Instead, they are spaced according to the specific interests of the body that owns them. The measurements are, therefore, neither comparable nor complementary, and often they are found to be contradictory (Hadjiathanassiou et al., 1992).

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[7] Council Directive 93/389/EEC in Official Journal L 167/31, July 9, 1993.

[8] Council Directive 80/779/EEC sets the limit and guide values for sulphur dioxide and suspended particulates and has been implemented by all member-states. Council Directive 82/884/EEC sets the limit values for lead and has not yet been implemented in Germany only. 85/03/EEC concerns nitrogen oxide and has not been implemented in Belgium, Germany and the UK. Council Directive 92/72/EEC concerns monitoring of ozone and 93/389/EEC concerns monitoring and stabilising by the 2000 emissions of CO_2 and of other greenhouse gases (The EC Committee of the American Chamber of Commerce in Belgium, 1994).

A general impression of the situation, as required by the present approach to Thessaloniki, can be obtained mainly from reports on the atmospheric pollution of Thessaloniki produced by the *Organisation for the Master Plan and Environmental Protection*, after taking into account the measurements of all authorities involved.

There are two types of atmospheric pollution:
(1) from substances that accumulate in the atmosphere and affect the global, rather than the local, environmental situation, namely greenhouse gases [carbon dioxide (CO_2), methane (CH_4), chlorofluorocarbons (CFCs), nitrous oxide (N_2O), tropospheric ozone (O_3)] and ozone depleting substances (mainly CFCs and halons) (OECD, 1991, pp17-30).
(2) from substances which affect the atmosphere at a local level resulting from a combination of factors such as concentration of pollution sources, climatic and geographical factors. The effects can be temporary but are detrimental to human health in the long term. High concentrations of carbon monoxide (CO), sulphur compounds, nitrogen oxides (NO_x), Volatile Organic Compounds (VOC), tropospheric O_3, and lead (Pb) are the most common incidents of this type of atmospheric pollution. Photochemical smog, which occurs when NO_x or VOC react in sunlight, is also pollution of this type (OECD, 1991, pp48).

Greece's per capita emissions of CO_2 from fossil fuel combustion were 7. 214tonnes in 1992. This is well below the European average for that year (8.668t). It is, however, important to note that while most member-states have reduced or stabilised their CO_2 emissions between 1980 and 1990, Greece has shown over 31% increase in the same period (Eurostat, 1995, p357). Thessaloniki, with an increasing share of the country's total fuel consumption, can be inferred to be contributing significantly to that increase (see table 5.3.)

Thessaloniki faces a serious problem of atmospheric pollution of the second type resulting from emissions from industry, space heating and automobiles. The city's industrial zone is the second biggest concentration of industries in Greece[9], accounting for 17% of the country's total industrial potential and comprising units for crude oil refining, steel processing, production of fertilisers etc. (Stamelos, undated). Industry occupies several areas around the city with greater concentrations covering an

[9] The biggest industrial concentration is the Greater Athens area where more than one third of the country's industrial units are situated.

extensive area on the West and Northwest. Because of lack of adequate planning and development control, industry has been situated without any concern for its environmental impacts and residential areas have been spreading unrestrained to its neighbouring sites. Hence, there are certain districts to Western Thessaloniki that suffer severe environmental conditions as they are almost adjacent to polluting units of chemical industry. Furthermore, views have been expressed regarding the possibility of further aggravation of the city's atmospheric pollution by the prevailing North wind that is possibly transferring poisonous emissions from the industry to the city centre (Ministry of the Environment et al., 1995).

Industry is the most important cause of pollution in Thessaloniki's atmosphere. It accounts for 96.3% of particulates which are the most serious problem in the city's ambient air quality, 2-2.5 times above the limit values set by the EU. Industry is also responsible for 89.4% of the total sulphur dioxide (SO_2) emissions, 32.2% of NO_X, and 32.9% of the VOC (Hirakaki, 1995, Hirakaki, undated). In 1989, a sulphur scavenger plant was installed in the oil refinery situated to the West of the city. This measure, combined with the reduction of sulphur in commercial oil used for heating, which was introduced the same year, resulted in reduction of the yearly SO_2 emissions in Thessaloniki by almost 50%. However, emissions of SO_2 are still found to be well above the EU limit values in residential areas adjacent to the industrial zone to the West of the city (Nikolaou, 1995, Hirakaki, undated).

Traffic is mostly responsible for emissions of CO[10] which have been often found to exceed the limit values set by the World Health Organisation (WHO) and the EU. At the moment, about 25% of vehicles have catalytic converters which are proved to emit less polluting gases than conventional cars. In 1991, Greece launched a scheme encouraging replacement of old cars with new ones equipped with catalytic converters. The aged vehicle fleet of the city was renewed as 25,000 car owners replaced their cars while the scheme was active (Stamelos, undated). Emissions of CO, VOC, and NO_X have already been reduced in the Greater Thessaloniki Area. Concentrations of lead (Pb), mainly produced by automobile traffic, have also reduced by the parallel introduction of unleaded gasoline. However, the constant increase in the number of cars moving in the city is likely to counteract the beneficial effects of new technology in cars and cleaner oil (Nikolaou, 1995).

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[10] In 1993 traffic was responsible for 99% of the CO, 51.3% of smoke, 60.2% of NO_X, 65.5% of VOC, 2.2% of SO_2 and 3.1% of TSP (Hirakaki, 1995).

It should be noted that, concentrations of car-generated air pollutants do not only depend on the amount of cars circulating. Traffic conditions play a significant role e.g. idle or slow moving petrol engines, in conditions of congestion, emit more pollutants than moving ones. This is a serious cause of high concentrations of CO in Thessaloniki, where traffic is often very slow, and stresses the imperative for transport management and traffic control. Concentrations are also dependent on the geometrical characteristics of the street. Narrow streets lined with high buildings obstruct dispersion of pollutants, while open green spaces facilitate ventilation and may act locally as filters of dust and other pollutants. Remarkable differences have been found between measurements of CO across Thessaloniki. High concentrations, it has been shown, are often pertinent to adverse geometric characteristics of the street - small width, high buildings, absence of open space - and to badly managed traffic conditions rather than being directly correlated to the number of circulating cars (Vougias, 1985, pp141-144, Nikolaou, 1995).

The third source of air pollution in Thessaloniki is emissions from domestic and institutional heating. Research carried out by the *Organisation for the Master Plan and Environmental Protection* has shown that 63.5% of residences in the city are centrally heated and fuelled with oil and consume a total of 13,000,000 litres annually. According to the same research, only 25% of central heating boilers operate according to good combustion parameters. It is estimated that, if good combustion parameters are assumed, heating between November and April accounts for 16.8% of SO_2, 15.2% of the NO_X and 21.4% of total smoke emissions in the city. This contribution is reduced during the rest of the year when heating is not required (Hirakaki, 1995).

The following factors make the problem of air pollution in Thessaloniki comparable to, and at times even more severe than, that of Athens:

- The city is built in very high densities, features tall buildings, narrow streets and conspicuously few open spaces. These characteristics obstruct ventilation between buildings and facilitate accumulation of pollutants into the urban atmosphere, a phenomenon observed in other densely built cities and commonly described as 'street canyon' (Nikolaou, 1995, Stamelos, undated).
- During most of the year local winds and rainfall are low. These climatic factors exacerbate the effect of the previous characteristics of the city's fabric.
- Increased solar radiation, typical for a Mediterranean city, interacts with the emitted pollutants and contributes to the creation of photochemical fog (Nikolaou, 1995).

5.2.3 Materials

Examination of the materials' cycle of Thessaloniki discloses a process of, constantly increasing in value and expanding in area, impacts on the immediate and surrounding environment.

Organic Waste and Water Pollution

Until 1925, Thessaloniki's domestic waste water was disposed in septic tanks. That year the first sewage system for the city was constructed, which selected domestic waste water together with rainwater and discharged it, untreated, through several outlets directly to Thermaikos Gulf[11]. The waters of Thermaikos were capable of self-cleaning and suitable for swimming, fish and shellfish production until 1970. Apparently, that year the Gulf's capacity to absorb was exceeded. Dead fish, strong odour and displeasing colour were the signs of serious pollution of Thermaikos Gulf and made the necessity for measures obvious. Several beaches were declared unsuitable for bathing and shellfish production dropped dramatically[12].

The quality of the waters of Thermaikos is further degraded by fertilisers and pesticides, rich in nitrates and phosphates, which are discharged into the Gulf through four rivers that flow into its waters, after irrigating Greek and former Yugoslavian agricultural land. Furthermore, some 60,000m^3 per day of industrial waste water are also discharged into Thermaikos. Finally, the closed shape and the small mean depth (approximately 20m) of Thermaikos Gulf obstructs water circulation and dispersion of pollutants to the Aegean Sea and facilitates their concentration to the Gulf's innermost part (Kouimtzis, 1992).

Planning a response to this situation began early in the 1970s. Since 1975, a special state authority has been responsible for managing sewage disposal in Thessaloniki. Between 1983 and 1989, a main collector system was constructed that separates rainwater from domestic sewage, and a sewage treatment plant near River Gallikos to the West of the city. The plant remained idle until 1992. Rainwater is still discharged directly into the sea while sewage is led to the plant at the banks of Gallikos River. According to the original plan, this would only be the first of a two-stage treatment process while the second stage would start its operation within a few years' time. The

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[11] The first sewage system of Thessaloniki was part of the 1918 Plan of the city by E. Hebrard (see Chapter 5, pp15-17).

[12] Thermaikos Gulf hosts the largest fishery in the country. Its production fell from 100,000tonnes in 1960 to 18,000tonnes in 1985 (Stamelos, undated)

treated effluent would then be piped to River Axios (12km away) and, through its waters, discharged into outer Thermaikos Gulf. The flow of the Axios, however has decreased substantially since the 1970s as a result of over exploitation for agricultural purposes, and is practically zero during summer months[13]. Therefore, it is not a suitable recipient for the bulk of the city's waste. In addition, being a protected wetland, it requires that the incoming waste water is treated to a very high standard (Ziogou, 1992).

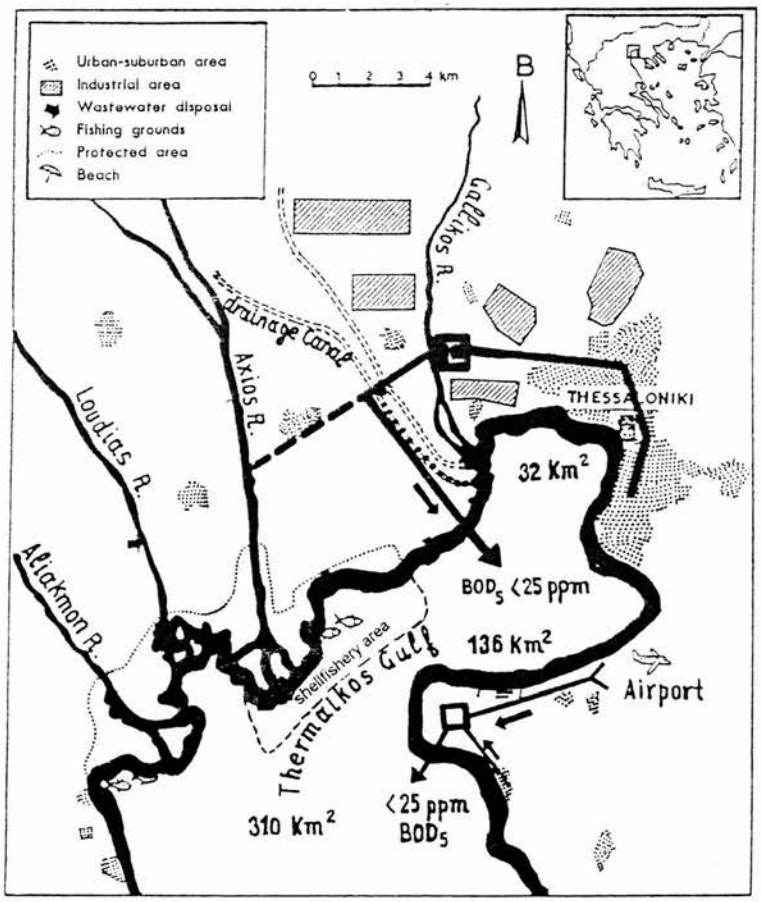

Figure 5.3. Domestic waste treatment in Thessaloniki area (source: Kouimtzis, undated)

The plant at the banks of Gallikos River was modified to a conventional one-stage biological treatment plant, but is capable of treating only one third of the city's organic waste (40,000m^3) [14]. The rest 80,000m^3 per day are still discharged untreated into the

[13] The flow of River Axios reduced from 120m^3/sec in the end of the 1970s to 3m^3/sec in 1991 (Laskarides, 1991).

[14] Council Directive 91/271/EEC concerning municipal waste water treatment requires that Municipalities of over 15,000 inhabitants have their municipal waste treated biologically including a secondary settlement process by the year 2000 (The EC Committee..., 1994, p25) . At the moment, Thessaloniki's plant treats one third of the city's waste in a conventional one-stage treatment and does not have the capacity to treat the rest.

waters of Thermaikos Gulf along with about 60,000m^3 untreated industrial wastes and agricultural residues.

The solid remainder of the treatment is transferred and landfilled in the only operating landfill site to the Southeast of the city, which will reach its capacity within the next few years. Thus, the highly treated sludge exacerbates the degradation of area where the landfill site is situated and aggravates the already serious problem of landfill site shortage in the Greater Thessaloniki Area. Instead, this remainder could be used as a fertiliser for the surrounding agricultural land. The treated effluent liquid could be used for irrigation of adjacent crops. Had these possibilities been taken into account, the organic nutrients contained in the city's waste water would be recycled and its effects on the surrounding environment would have been reduced.

Thermaikos Gulf faces a serious problem of low dissolved oxygen content, eutrophication and high concentration in trace minerals and hydrocarbons (Ministry of the Environment et al., 1995, p99) Apart from disrupting the marine ecosystem and degrading the image of the city, high levels of pollution have a strong impact on the economy of the area, as they affect the function of the fisheries and of the neighbouring tourist beaches.

Solid Domestic and Industrial Waste

Thessaloniki produces approximately 1,200 tonnes of solid domestic waste per day[15]. This amounts to approximately 1.2kg per capita per day and is very close to North American standards of waste production which are the highest in the world. Yet, this amount is expected to double by the year 2015. The goals of the Corporation of Local Authorities (OTA), which is the authority responsible for the management of waste in the conurbation, are to modernise waste collection and disposal, recover abandoned landfill sites and implement sanitary landfilling to new ones. However, it is, nowadays, an accepted view that landfilling of waste is an environmentally hazardous practice (see Chapter 2).

Thessaloniki, like most big cities, faces an acute problem of lack of landfill sites. As mentioned earlier, there is only one landfill site currently receiving the city's waste, which will soon reach its capacity. Suggestions for new sites face the reaction of the respective inhabitants who do not want to bear the environmental costs and do not

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[15] Information provided by the Corporation of Local Authorities of the Greater Thessaloniki Area in August 1995, thourgh personal communication.

trust the state to ensure the site's recovery, as European and national laws require, after it reaches its capacity.

The possibility of exploiting 'landfill gas', emitted by the only operating landfill site of Thessaloniki, to produce power for the adjacent village of Tagarades has been explored and found feasible. Nevertheless, it has not been realised. The centralised structure and monopolistic nature of the Public Power Corporation is the main obstacle against this plan.

Reducing the amount of waste produced in the first place and exhausting possibilities of reuse and recycling would reduce significantly demand for landfill sites and related environmental costs and would save primary energy and materials. On average, it has been estimated that, waste produced in Thessaloniki contains 17.7% paper, 5.9% metals, 7.2% plastics and 4.1% glass A recycling programme was initiated by the Corporation of Local Authorities of the whole conurbation in 1989. Starting with paper only, it has recently extended to aluminium recycling. In 1995, the Corporation was collecting 200 tonnes of paper per month which compares well with the 50 tonnes/month that it was collecting in 1991[16]. This is still only 3% of the paper that is contained in the city's domestic waste.

Plans for controlled disposal of Thessaloniki's solid industrial waste, which amount to over 600,000 tonnes annually, have not been implemented[17]. This is mostly because of resistance of the local communities of suggested disposal sites as well as because of lack of co-ordination between the different bodies and authorities involved (Ministry of Environment et al., 1995).

Water

The water supply of Thessaloniki is controlled by a special state authority. The city still covers its needs in water from sources relatively close to its territory. Until 1880, when Thessaloniki's population was 180,000 people, the city's needs were covered by local wells. Starting that year, water was imported from Mount Chortiatis and later from sources around the village of Kalochori, on the banks of Gallikos River, situated to the West of the city. Increasing extraction, to cover expanding water demands,

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[16] Information provided by the Corporation of Local Authorities of the Greater Thessaloniki Area in August 1995, thourgh personal communication.

[17] The European Commission took Greece to court in 1991-2, with regard to the uncontrolled and environmentally hazardous way of industrial waste disposal in the country. Pressure is being put by the Commision for legal and efficient disposal (The EC Committee..., 1994, p148).

resulted in subsidence of the land, lowering of the water table and, subsequent salination of the underground water reserves in the area of Kalochori (Municipality of Stavroupoli et al., 1996, p32). Subsequently, water was pumped from sources in Narres, also by the Gallikos River, but further inland. In 1980, as this river became dry, sources near the village of Aravissos, still to the West but further afield, became the main supplier of water for the city (Stamelos, undated).

Today, Thessaloniki needs 180,000-230,000 m^3 of water per day which it receives from several sources around the city. 20% of this amount is used by industrial plants and 30% is lost during distribution through an old and poorly maintained network.

Since 1900, water requirements per capita per day has increased from 4-30 litres to more than 180 litres (Stamelos, undated). Considering further population increase as well as per capita increase of water demands, it is estimated that present sources will soon be insufficient. Response to this projected shortage is the planned extraction of water from River Aliakmon which is situated to the Southwest of the city. There is an investment intensive project involved in this solution while the quality of the river's waters has not yet been unanimously accepted[18].

5.2.4. The Urban Fabric

Notwithstanding the city's long (over 2,300years) history, its urban fabric reflects the rapid process of urbanisation of the 1960s and 1970s. Until the last third of the 19th century, the city had hardly developed beyond its 15th century fortification, which enclosed an area of, roughly, 350 Hectares. In the 1990s, Thessaloniki covers over 6,000 Hectares. More than one fourth of the total building stock existing in Thessaloniki in 1990 was built between 1961 and 1971 (NSSG, 1995, p321). Apartment buildings built during that period, display a marked homogeneity, and low design and construction quality, reflecting a rapid and repeated process of production. Thessaloniki's image is indeed determined by that process. Its fabric may partially explain why, despite being the home of Hellenistic treasures and Roman, Byzantine and Ottoman monuments of great significance, Thessaloniki never had significant tourist development.

The 'building cells' of Thessaloniki's fabric are multi-storey apartment buildings. Indeed, this is one of the most obvious physical differences between modern Greek

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[18] Information provided by the Water Organisation of Thessaloniki, through personal communication.

cities, in general, and Western and Northern European cities. On average, more than half (53%) European households live in single family houses (detached or terraced). This percentage, however, covers huge regional differences, ranging from Ireland with 95% of its households living in single family houses and the United Kingdom with 87% to Italy with only 34% and Greece with 36% (Eurostat, 1997).

Apartment blocks accommodate high residential densities. Thessaloniki's whole city density is approximately 125 people/Hectare (including open spaces). This is over double the density of most European cities, for example, that of Amsterdam with 51 people/Hectare, London with 56 people/Hectare, over three times the density of Toronto (40 p/H) and six times that of Los Angeles (20 p/H) (Newman and Kenworthy, 1989, p42). Peak density in the centre of Thessaloniki is over 500 people/Hectare (Ministry of the Environment et al., 1995).

An interesting feature of the city's fabric is that densities do not become significantly lower in the suburbs, nor is there a clear correlation between low densities and higher incomes. Indeed, the previously mentioned shift of Thessaloniki's population to the suburbs is not physically manifest in single-family houses and low densities, typical of the North American and West and North European urban sprawl. Instead, in most suburbs, apartment blocks are the norm. The nature of the city's expansion is different to the West and North European and North American one in two more respects. First, Thessaloniki's expansion is not strictly residential and retains the mixture of uses encountered in the urban core, almost unaltered. Monofunctional zones are rare in all Greek cities. Second, social segregation is not reflected spatially, with the clarity and homogeneity of cities in the West. Instead, there is often some kind of stratification expressed vertically within the apartment blocks: lower floors are occupied by lower income households and upper floors by higher income ones. Working- and middle- class live together in this way while upper class households tend to be more segregated. Spatialisation of social structure, to the extent it occurred, has so far been the reverse of that normally encountered in the Western Europe; high incomes occupy the centre and lower ones occupy the urban fringe (Leontidou, 1990, pp12-13).

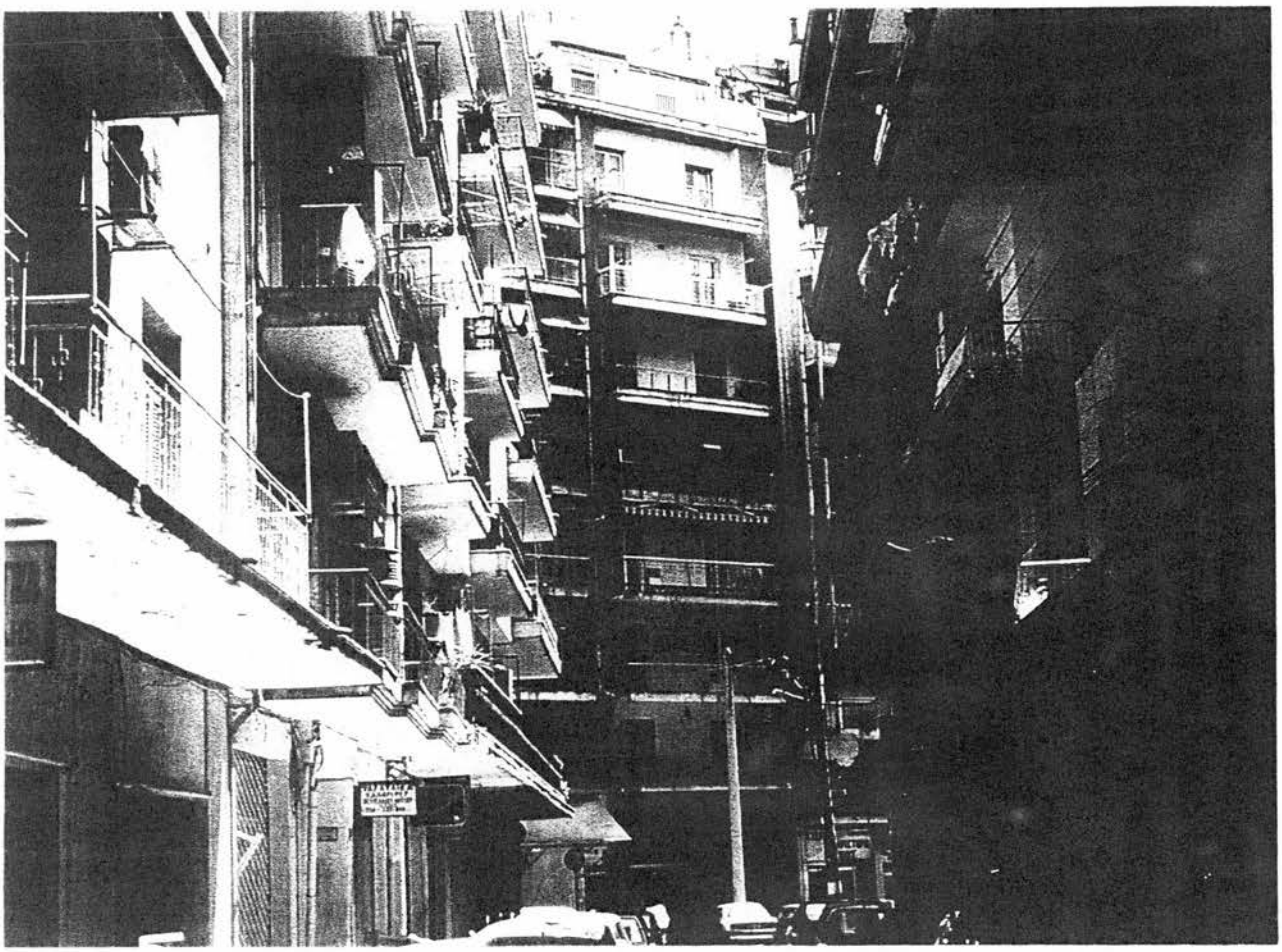

Figure 5.4. The 'building cells' of Thessaloniki's fabric are multi-storey apartment buildings

The above characteristics of the fabric reveal once more the irrelevance of the cause for the compact city for Thessaloniki. Densities are high, land uses are mixed and journeys to work are still comparatively short. These are the features *par excellence* of a sustainable city, according to the proponents of the compact city. They show the direction that cities world-wide should move towards, according to Newman and Kenworthy, to reduce car journeys and hence car-related air pollution. Nevertheless, there is an acute problem of atmospheric pollution in Thessaloniki a major part of which is indeed generated by increasing car use. High densities in Thessaloniki are related to atmospheric pollution, as densely built areas obstruct ventilation and, hence, dispersion of pollutants. They also reduce opportunities for traffic management, the lack of which is a major cause of pollution, and open space, which could alleviate the problem locally.

The uncontrolled and rapid manner in which the city of Thessaloniki has developed has resulted in a conspicuous lack of open spaces, whether civic squares or parks. The total existing green space in the city amounts to a scanty 2-3m^2 per person which is way below the requirements for 10m^2 /p, by the city's official plan, and the amount of green open space encountered in West and North European cities. Greenery in Thessaloniki is mostly in the form of trees lining streets, while there is a very limited number of parks.

Notwithstanding quantity, it is also the quality of Thessaloniki's green spaces that is inadequate. Parks are generally poorly equipped and badly maintained. They are only meant for decoration. Their recreational value and their potential contribution to the ecological balance of the city are overlooked.

Parks can function as filters of dust and controllers of pollutants like CO, SO_2, NO_2, and heavy metals. Although, they cannot influence the quality of urban atmosphere on the whole, they can have local effects. Hence, open spaces rationally distributed across the city may be effective in terms of pollution control (Hough, 1984, pp43-44). The same is true for control of the urban climate. The phenomenon of the 'urban heat island'[19] which has been observed in many metropolises world-wide, is caused partly by the lack of urban soil-covered parks and the prevalence of impervious surfaces which absorb solar radiation, like tarmac and stone (Douglas, 1983, pp33-39, Hough,

[19] 'Urban heat island' is the phenomenon of observed higher temperatures in cities than those observed in the surrounding countryside, particularly during the night. This phenomenon affects the quality of the urban ambient air as well as the city's energy consumption (Douglas, 1983, pp33-39, Hough, 1984, pp32-34).

1984, pp32-34). The phenomenon has been recently observed in Thessaloniki (Stamelos, undated). Finally, the lack of urban greenery disturbs the urban hydrology. Rainwater falling on tarmac covered and paved surfaces does not infiltrate the soil to replenish underground watercourses. The latter may lead to lowering of the water table underneath the city (Douglas, 1983, pp51-67).

There is potential for green open space, in the form of woodlands on the hills fringing Thessaloniki. Despite their being protected by the *Master Plan* as well as being designated for reforestation, they face intense pressure for development. On the hill to the Northeast of the city, there is a forest area which has recently been bisected by the city's ring road, built to reduce traffic loads, and pollution levels in the city centre. Even more recently (July 1997) the same hill was extensively burnt, possibly an action of arson aiming to facilitate development opportunities created by the ring road. There are also approximately 40,000 hectares on other surrounding hills that have been designated for reforestation since 1973 (Dafis, 1985). They all need to be protected from expanding urban uses such as residences, leisure and businesses which are threatening their integrity.

The *Master Plan and the Programme for Environmental Protection of Thessaloniki* recognise the imperative for protection of all the natural habitats of the Greater Thessaloniki Area. The *Organisation* responsible for the *Plan's* implementation has devised regulating tools aiming at protection of existing green spaces and creation of new ones in areas with very high density.

5.3. Thessaloniki as the 'Object of Planning'

There is a long history of attempts to direct and control the development of Thessaloniki. There is, however, a constant gap between proposals and official plans and the actual reality of the city's fabric and operation. In a similar vein, to proposals towards urban sustainability (see Chapter 3), plans about Thessaloniki tend to address the whole city placed in its region, the neighbourhood and the individual building.

5.3.1. An Ambitious Beginning

Thessaloniki was founded in 316BC by Kassandros[20] and has always been an important administrative and economic centre and a significant port. Most probably, it was originally built according to a gridiron plan, typical of the Hellenistic Period.

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[20] Kassandros was king of Macedonia between 305/4 and 297 BC when he died. He was married to Thessaloniki, sister of Alexander the Great [see Hasiotis (ed), 1997, Papagiannopoulos, 1982, etc.].

There are no traces of the original plan, however, as successive layers of history have been superimposed on it and many disasters - fires, earthquakes - have changed its form[21]. A conscious attempt to improve the city's congested environment and direct its future development was that of the Ottoman administration during late 19th century. That was not a comprehensive plan for the city but piecemeal interventions aimed at improving traffic in the city and its transport connections. They also aimed at facilitating expansion outside the city walls to relieve congestion (Yerolympos, 1995, pp14-34).

The first comprehensive plan of the city was compiled by a group of French, British and Greek planners specially called upon for that project, by the Greek Government. The group was led by the Frenchman Ernest Hebrard. The need for a new plan for Thessaloniki arose after the great fire that broke out in August 1917 and destroyed the city centre almost completely. It was only five years earlier that the city had been annexed to the newly-born Greek State, after being part of the Ottoman Empire for almost five centuries (1430-1912). The event of the fire was seen by the Greek Government as an opportunity to eliminate the prevailing, albeit undesirable, Ottoman character from the city's fabric, give it the modern function and image of a European city and assert the city's position in the politically unstable geographical area of Macedonia. Rebuilding Thessaloniki has to be seen as much as a project of urban planning as one of political significance. That was the first *Master Plan* ever designed and implemented in Greece, strongly influenced by the prevailing planning ideals in Europe and the United States in that period, and a landmark for the beginning of urban planning in Greece.

The 1918 plan incorporated all the elements of the newly born 'science' of urban planning, as developed in Britain, France, Germany and the United States. The process was initiated by a detailed survey of the burnt city, demarcating properties and assigning market values to them . The plan comprised, apart from the street plan, land use plan, building regulations, prescribed facades around existing monuments and new civic places, plan for future expansion and new infrastructure. No reference whatsoever was made to the old city's street plan, its previous architectural tradition or the spatial distribution of its several ethnic and religious communities. Monumental axes, ample open spaces and parks, controlled facades with eclectic references to

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[21] For a concise history of Thessaloniki see (Papagiannopoulos, 1982).

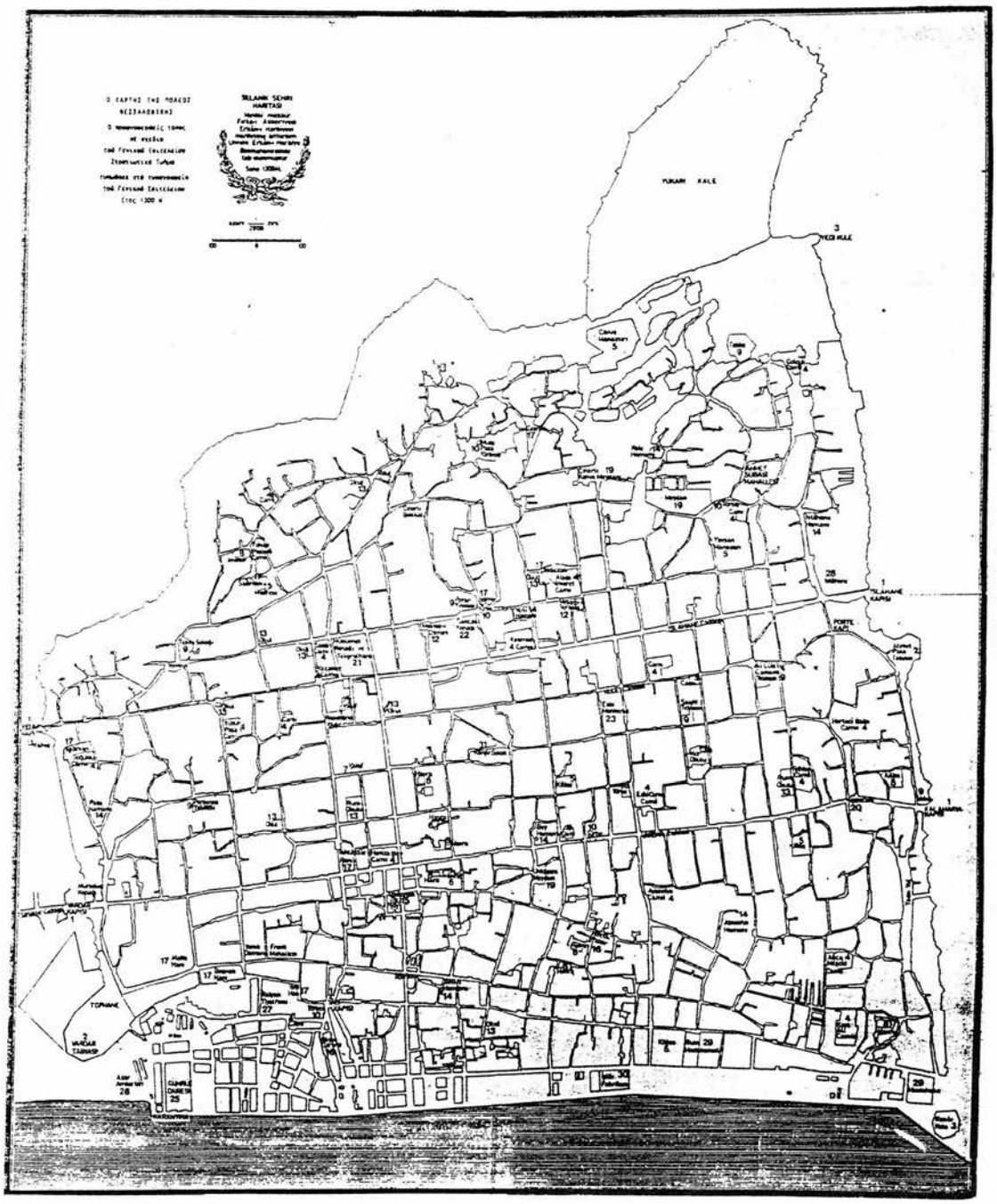

Figure 5.5. The city of Thessaloniki in 1882-3 (source: Samoulidou, Stephanidou, 1983, published in Yerolympos, 1992, p20).

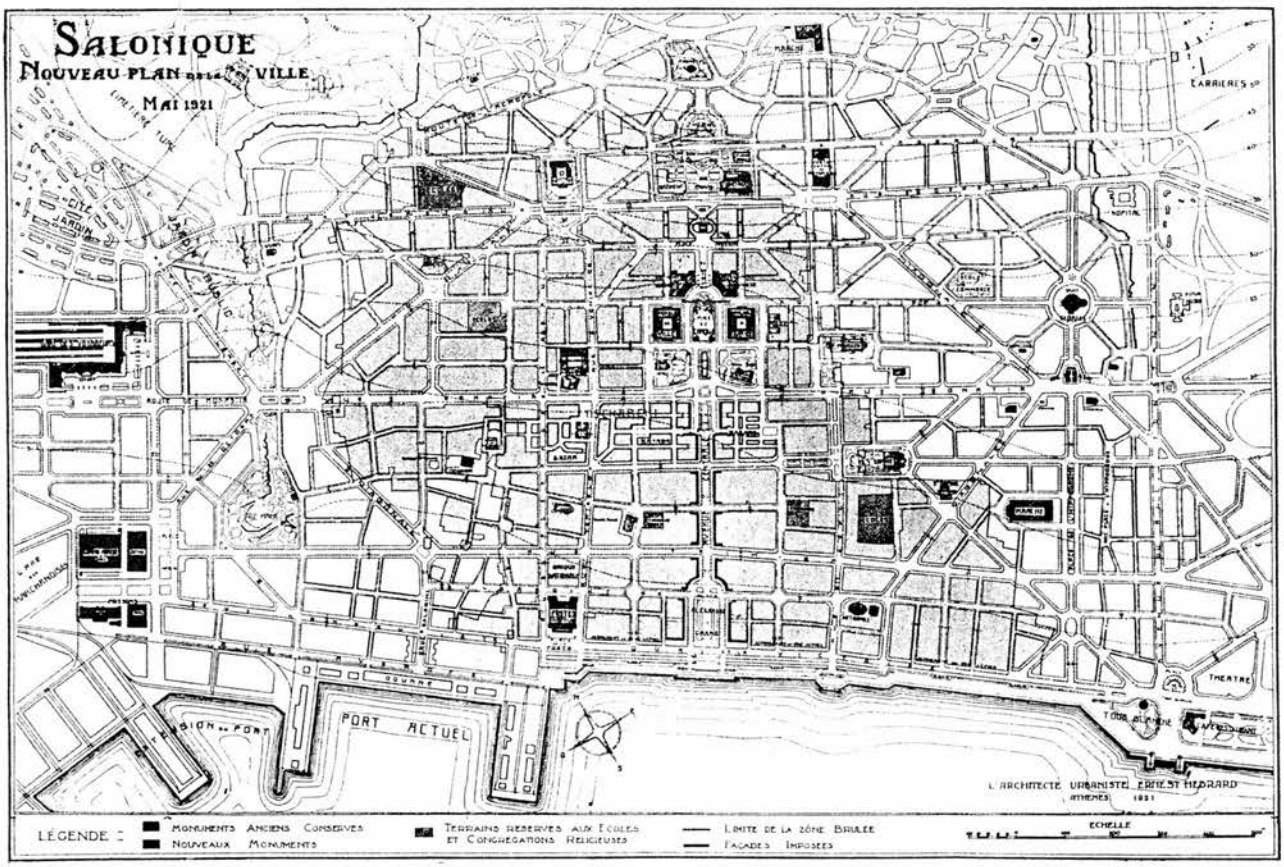

Figure 5.6. Hebrard's final plan for Thessaloniki (1921) (source: Hebrard, Dreyfus 1923, published in Yerolympos, 1992, p164)

Byzantine and Neo-classical architecture were the main characteristics. In its strong monumental character, Hebrard's plan appears to be influenced by the American City Beautiful Movement in urban planning. Indeed, the plan exhibits marked analogies to the equivalent for Chicago, created by the initiator of the Movement, Daniel Burnham in 1909, and with that of New Delhi, created by Herbert Baker and Edwin Lutyens in 1913 (Hall, 1994, pp175-202). In terms of land use, the suggested plan attempted a rational distribution of uses with clearly defined residential areas, commercial functions, industrial zone etc. The city would accommodate an optimum of 350,000 inhabitants in a total of 2,400 hectares.

In parallel to the plan, a special piece of legislation was created determining the process of its implementation. Despite the 'top-down' nature of the process, which called for total abolition of old properties' boundaries and positions, the project would be self-funded by the surplus value of the land, generated by the intervention itself, and would be carried out by a co-operative of old property owners with mechanisms aiming at social justice and participation. Each new landowner would develop his plot individually following new building regulations (Yerolympos, 1995).

However, there was strong reaction against the plan by the old property owners which boycotted the process of reconstruction. In 1920, after a change of government, the original plan was modified, starting by reducing open space, originally comprising 50% of the urban area, and subdividing plots. Legislation was also altered. The process lost its social nature and was gradually left uncontrolled. Restrictions to individual buildings were relaxed. In 1922, approximately 1,500,000 refugees came to Greece from Asia Minor, a lot of which settled in Thessaloniki, creating a huge demand for housing, covered by the state and the private sector. Processes had to be accelerated and room for speculative development was created[22].

Hebrard's Plan for Thessaloniki has formed the basis on which the street plan of the city centre and land uses developed until today. It has also been a catalyst for dismantling Thessaloniki's medieval spatial organisation in ethnic and religious communities and replacing it with one based on socio-economic class, echoing the capitalist model of Western Europe. The plan has been very influential in the formation of the first general law regarding expansion of cities and towns and creation

[22] For an account of Thessaloniki's reconstruction after 1917 see (Yerolympos, 1995).

Figure 5.7. Aristotelous Square: The only monumental axis with prescribed facades from Hebrard's plan that was implemented.

of new ones, in Greece. This law came into action in 1923 and remained the general framework of urban planning in Greece, practically, until 1979[23]. The first Building Code was introduced in 1929 also under the influence of the pattern of urban development introduced to Thessaloniki by Hebrard. The dominant increment of development of the modern Greek city, namely the individual apartment building on an individual urban plot, can be said to have originated in Hebrard's plan for Thessaloniki.

The optimum population and land area of Thessaloniki, set by Hebrard's plan, have been long exceeded by far without any comprehensive attempts to update the original plan's potential. Most of the proposed open spaces have been encroached and only one of the monumental streets and civic squares with controlled facades has been implemented (figure 5.7.). Furthermore, permitted buildable space, plot coverage and height have been constantly increasing since 1918, with the period of the dictatorship, 1967 to 1974, being the most yielding, in this respect. The area occupied by Thessaloniki has been also constantly increasing, whether by piecemeal extensions of the official plan or by unauthorised settlements built in its periphery.

Despite a very ambitious, 'rational' and comprehensive plan, employing most principles of urban planning to date, Thessaloniki followed a course of evolution similar to that of Athens and most Greek cities. This course is characterised by successive modifications of official plans, under the pressure of personal interests and demand for speculation, marginal interpretation of laws or exploitation of their gaps and vagueness, and, finally, rigorous 'informal' planning (Philippides, 1990). The story of Thessaloniki's reconstruction plan exemplifies the gap between formal planning and urban reality in Greece. The plan itself and the national legislative framework that followed it in 1923 were very similar to equivalent plans and laws in Europe and the United States at the time. While in the latter cases, planning had been the reaction against the living conditions of the working class, following industrialisation and urbanisation, in Thessaloniki it has been imposed on a non-industrialised society, still spatially distributed according to ethnic and religious kinship (Yerolympos, 1995). In effect, the plan rather than responding to conditions created by the transition to capitalism, itself accelerated this transition.

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[23] Reference is made to Law N947/1979 regarding residential areas.

5.3.2. Post-war Planning in Thessaloniki

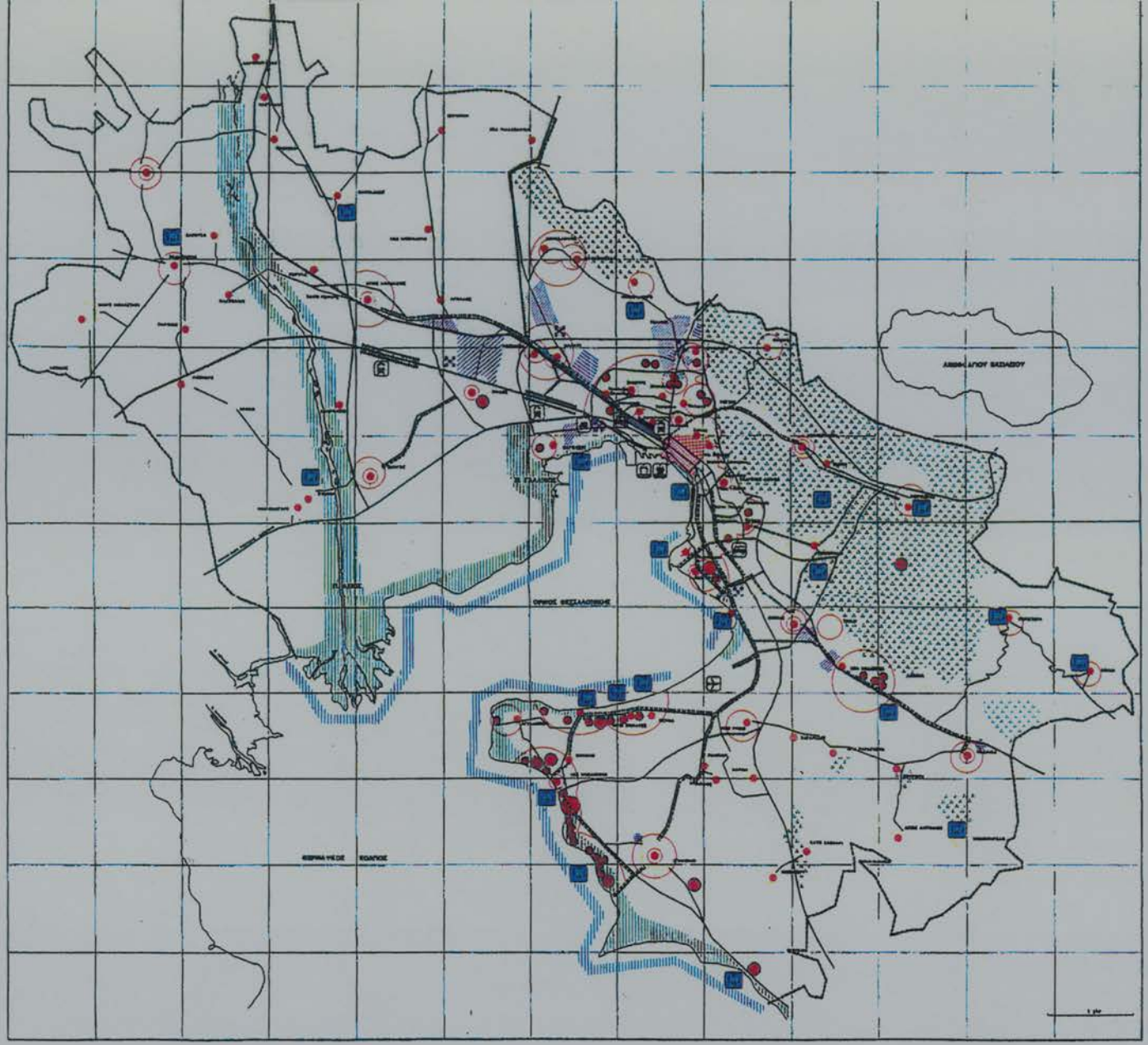
A similar sequence of events has been repeated in Thessaloniki and, with less ambitious beginnings, in the rest of urban Greece with cyclical predictability. In 1966, the first comprehensive attempt to survey the city and suggest a land-use plan for it was carried out under the auspices of the Aristotle University of Thessaloniki and was never implemented. However, it formed the point of departure of all proposals that have followed it, including the one which is currently in action. This attempt was followed by a proposal for a Master Plan by the Ministry of Public Works which was subsequently criticised and altered in 1976 and 1977, without ever being legalised. A call for proposals by the Ministry of Northern Greece towards four bodies: a private practice, the Municipality of Thessaloniki, the Aristotle University and the Technical Chamber of Greece was the next step. Finally, in 1985, as part of *Operation Urban Restructuring*, which was a nation-wide campaign to manage and regulate urban development, Law 1561/85 set the objectives and general directions for the *Master Plan of the Greater Thessaloniki Area.* The *Programme for Environmental Protection of Thessaloniki* was part of the same law and introduced the first legislative framework for the protection of both the natural and the built environment of the city (Ministry of the Environment et al., 1995, Andrikopoulou-Kafkala, 1979).

The general framework created by the *Master Plan for the Greater Thessaloniki Area* intends to upgrade the city's centre intensifying its historic character, to protect its natural environment and improve quality of life for its inhabitants. Among the plan's main objectives is also the elimination of social inequalities among different areas of the city.

Towards realisation of these general objectives for Thessaloniki's future development, the *Master Plan* recommends:

- containment of the conurbation in its existing territory,
- encouragement of a polycentric, rather than the present monocentric, operation,
- emphasis on the concept of neighbourhood as the unit of development and regeneration, and
- strict control of land uses.

Areas of unauthorised settlements should be included to the approved city plan, with a view to legalising them and providing them with infrastructure and social urban



LEGEND

- Boundaries of Greater Thessaloniki Area
- Centre of Metropolitan importance
- Centre of Municipality of wider influence
- Centre of Municipality
- Historic Centre
- Direction of Expansion of Central Administration
- Wholesale market
- Industrial Area
- Industrial Parks
- Agricultural land
- New extension units
- Big settlements
- Approved city plan
- Zone of controlled development of coastline and riversides
- Protected mountains
- Recreational and cultural spaces
- Regional railway
- Main public transport network
- Main road network
- Secondary road network
- Terminal Stations
- Freight station
- Coach station
- Sorting Railway station
- Commercial Railway station
- Passengers' Railway station
- Airport
- Passengers' port
- Commercial port
- Special adjustment zones

Figure 5.8. The *Master Plan of the Greater Thessaloniki Area* (1985) (source: *Organisation for the Master Plan and Environmental Protection of Thessaloniki*).

amenities. Population increase in the conurbation should be limited to the natural, while housing and economic development should be directed to existing satellite villages in the periphery of the conurbation which should also be provided with social amenities. This is suggested with a view to decongesting the central urban core without expanding on agricultural land.

Focus at the level of the neighbourhood is a recurring theme in the recent planning history of Thessaloniki. The neighbourhood in official plans appears as a constituent part of the city fabric in need of regeneration and intensification in terms of use and identity, as well as an instrument towards decongesting urban cores. Therefore, it is more a concept for managing urban regeneration than one for planning new communities in the regional level. Both the *Master Plan* and the *Strategic Plan* , that followed it ten year later, encourage the intensification of the concept of the neighbourhood.

The establishment of the *Organisation for the Master Plan*, empowered to direct and overview the *Plan*'s implementation, was intended as a means towards integration and collaboration of the different authorities involved in Thessaloniki's management. In practice, this has not been attained and compartmentalisation and overlapping of responsibilities and actions are still the norm regarding issues of urban development and operation. Thirteen years after the *Master Plan* came to action, and despite its legal power, many of its objectives are marginalised, violated, or inactive and many are in need of reconsideration in view of new developments at a local, regional and global level. On the whole, it can be said that, despite its significance as the first enacted integrative and comprehensive plan for the GTA, after 1918, the *Master Plan* has not as yet reformed the way Thessaloniki operates and develops towards realisation of its central intentions. Without going into details regarding the shortcomings of the choices of the plan themselves, two reasons can be readily identified for the above failure:

- The *Plan* is typically detached both from social and economic processes that produce urban space and from choices of the city's inhabitants. It seeks to impose an urban form emanating from purely functional considerations and imported from Western planning traditions. It thus presents another case of reification of the city.
- The *Plan* does not reflect upon the process of its implementation. Instead, it produced a new body, destined to operate with the organisational deficiencies of Greek public administration, to co-ordinate authorities from various tiers of this administration. Michael Carley and Ian Christie identify this 'failure to confront

the management process' as one of the generic constraints of integrated environmental management. Addressing and resolving such constraints, they argue, should be part of any environmental management project (Carley and Christie, 1992, pp151-163).

The most recent proposal for the future of Thessaloniki, the *Strategic Plan*, has been the outcome of a research project of Aristotle University of Thessaloniki in collaboration with the Ministry of the Environment, Physical Planning and Public Works and the *Organisation for the Master Plan*. It does not have any legal power. The *Strategic Plan* stresses the importance of co-ordinating the fragmented actions currently shaping the city, towards establishing a common perspective that will take into account the totality of the city's problems and potentials, at a local, regional and international level. Commitment to the common perspective by all stakeholders, vertically at the administrative ladder and horizontally across all sectors of society, needs to be ensured on the outset (Ministry of the Environment et al., 1995, pp6-7). In stressing the latter as well as social cohesion and public participation, the *Strategic Plan* differentiates itself from the *Master Plan*. It is also differentiated by the emphasis it places upon developments occurring beyond the regional national and even European level, that may have a bearing on the city's future. The general directions around which the *Strategic Plan* is structured are:

- to intensify, renew and restructure the role of Thessaloniki as a centre for business and production,
- to intensify, renew and restructure the role of the city as a centre for culture and science.

Both directions hope to reassert Thessaloniki's position in the European, the Mediterranean and the Balkan area while promoting sustainable development (Ministry of the Environment et al., 1995, p136). Towards these directions, the *Strategic Plan* brings together existing proposals about the city, made by various bodies, to which it contributes its own. It places each proposal in its economic, social and administrative context, and assess its strategic role for the future of the proposal's immediate area of influence, the city and the region.

With regard to urban form, the *Strategic Plan* adopts the choices of the *Master Plan*, namely decentralisation, encouragement of the creation of multiple centres and emphasis on intensifying the city's identity. The latter, the *Strategic Plan* argues, is not confined in the city's historic centre. Instead, it lies in historic, or other

interesting, features of the building stock across the city, that need to be identified and promoted.

The *Strategic Plan* is an important step towards placing urban planning into its social and economic context, instead of producing 'rational' physical plans with scant relevance to reality. To an extent, it can be said to have employed two of the four generic steps suggested in Chapter 4, towards urban sustainability: contextuality and emphasis on processes.

However, the fabric of the city, the bulk of the city's building stock with no historic or other interest, is not identified as an issue of strategic importance and, hence, the processes that reproduce it are left untouched. Hence, the *Plan* overlooks a major force of unsustainability of Thessaloniki, one that affects not only its environmental performance in terms of energy and materials but also its social and economic function, and its role as a centre of cultural importance. This omission typically follows the tradition of plans of individual cities in Greece that, save conservation of historic areas, treat the city as two-dimensional and leave the development of its third dimension to be regulated and controlled centrally and homogeneously, by the General Building Code (GBC). This relationship is not challenged by the *Strategic Plan*. Neither are the economic and social aspects of the production of the fabric recognised.

This short account of the most significant moments in Thessaloniki planning history is intended to illuminate the following two points:

First, the remarkable and permanent incongruence between Greek urban reality and official plans aiming to control it has its intellectual roots in the insensitivity of the plans to the physical and non-physical constituents of the very urban environments they address. Borrowing techniques and methodologies from Western planning history, developed in response to different forms and processes, official planning in Greece overlooks problems of form, e.g. the multi-factorial role of the fabric, and of process, e.g. informal planning, that are not confronted by the imported models.

Second, Thessaloniki, and Greek cities in general, do not present a case of belated urban development, reflecting a belated process of industrialisation and transition to capitalism. They do not lag behind urbanisation of Western Europe, moving gradually towards an eventual convergence with the features and processes of West European cities. Instead, they present a different case of urban development. Lila Leontidou

argues against the above recurring misconception. She observes, in Greece and the rest of Southern European countries, that (Leontidou, 1990, p3):

> as their class structure approaches the pattern of late-capitalism, self-employment remains widespread; managers and executives co-exist with artisans, shopkeepers and free labourers; in the location of economic activity as CBDs are rebuilt with modern office blocks, mixed uses predominate; in housing allocation, as modern apartment blocks spring up, self-built neighbourhoods continue to mushroom; in urban development, several private and public, customary and irregular (illegal or informal) strategies coexist and affect the systems of production and reproduction.

5.3.3. Recent Responses to the Plea for Sustainability

Energy 2001: Action Plan

Unlike Hebrard's plan, the new *Master Plan* does not express concerns about the fabric of the city, other than that of the historic centre. To a certain extent, this is explicable by the fact that production of urban fabric is legally regulated at a national level by the General Building Code (GBC).

GBC is a set of rules that has been repeatedly modified, since its introduction in 1929, to allow for constantly increasing exploitation of individual plots. Increasing plot ratios and permissible heights have been instruments of political and economic significance. Spawned by the urgent need for housing in urbanising areas, particularly in Athens and Thessaloniki, and combined with the complete absence of public housing policy, investment in building construction has been among the most popular areas of investment in Greece since the early 1960s. It is indicative that, between 1970 to 1992, on average 6.10% of the Greek Gross Domestic Product, the highest record in Europe, was invested on housing. 27% of total investment in the country was directed to housing (United Nations Economic Commission for Europe, 1993, cited in Oxley and Smith, 1996). In essence, GBC functions more as a regulator of development rights and protector of adjacent plots and public land from encroachment, than as a determinant of architectural and urban form. There is scant reference to the level of urban configurations formed by individual buildings. Successive modifications of GBC and its emphasis on individual plot are physically manifest in the irregularity the fabric of Greek cities. Their respective violations aiming at further exploitation of the land have also left their imprint.

In general, environmental considerations of GBC are minimal. *Energy 2001: Action Plan*, is an attempt to inform the GBC and the building process with environmental

concerns and, hence, direct new building stock towards an environmentally benign operation (Ministry of the Environment, 1995). The *Action Plan* was commissioned by the Ministry of the Environment, Physical Planning and Public Works to several research agents related to environment-friendly building technology and was completed in February 1995. It is intended as part of Greece's response to its commitment as a signatory to *Agenda 21* and the *Convention for Climate Change*. *Action Plan* also outlines proposals as to how European Union Directives regarding levels of pollution and energy consumption can be met through improvements in the built environment. Its focus is on energy conservation.

The *Action Plan* presents a combination of regulatory and market-led measures towards reducing fossil fuel requirements in buildings. The latter measures are concrete resolutions of unsustainable features of urban Greek architecture: physical forms and applied technologies are drawn from the international vocabulary of passive solar architecture and active solar technology and fed into the existing regulatory system. The authors of the report suggest a number of amendments to, or extensions of, specific articles of the GBC. Most of the suggestions aim at encouraging the incorporation of passive and active solar heating, passive cooling and natural ventilation, as well as energy conservation, in general. An example of an amendment of the GBC is the proposed exemption of the volume and area of any passive solar feature or active technology applied on the building from the calculation of the permissible land coverage, volume and height. Another suggested change aiming at safeguarding winter solar access to south elevations is the extension of the currently set minimum distances from neighbouring buildings.

Apart from changes to the GBC, the *Action Plan* suggests certain economic instruments as a way of encouraging energy conservation and the use of renewable sources of energy, mainly solar energy. Tax concessions are proposed to buildings, existing or new, that use solar design strategies or incorporate related technology e.g. photovoltaic cells or solar collectors for hot water. The most radical measure suggested by the report is the introduction of the energy rating of buildings and the provision of 'energy identity', which is supposed to act as a booster to the market value of properties.

Finally, there are amendments suggested in the bureaucratic procedure preceding planning permission. An assessment of the energy demand of each scheme is to be submitted to the planning authorities when applying for planning permission.

Buildings that, according to the submitted assessment, are anticipated to consume more than a set maximum amount of energy - prescribed separately for different uses and for three climatic zones in the country - can be granted planning permission only if the demand in excess is covered by renewable sources. Another way that is suggested as promoting energy conservation and benign technologies through an amended bureaucratic procedure is prioritising control and granting of planning permission to schemes that exhibit such features over other schemes that do not.

Proposals made in the *Action Plan* have not as yet been implemented. One serious impediment against acceptance and implementation of the *Action Plan* is that the Ministry that had commissioned it has reservations regarding the economic incentives suggested. Without assessing the validity of the *Action Plan* itself, the reluctance of its initiator to embrace a combination of economic and regulatory policies represents a serious lack of commitment to its supposed goal. It also represents the lasting political and economic significance of building construction in Greece and the unwillingness of the state to confront and regulate it, as the corollary.

Rather than stemming from the Greek circumstances which they try to resolve, proposals made in the *Action Plan*, generally, represent eclectic transpositions of international policies and practices to Greece. Predictably, the *Action Plan* repeats constant failures of urban planning in Greece; the gap between theory and reality, and the split between urban planning and architecture. It is indicative of both failures that, when assessing the energy requirements of apartment blocks in three climatic zones of the country, all blocks are assumed to be facing South, to be detached and unobstructed. Although it is understandable to make assumptions in order to produce comparable results, it would be more useful if these assumptions bore some relation to real-life situations. The above assumptions may facilitate valid research in a low density suburban environment. In modern Greek cities, however, high densities of development result in high levels of solar obstruction. Moreover, the majority of apartment buildings are attached to one another rather than detached. Both the above have a bearing on a building's energy requirements.

In general, the *Action Plan* holds a very narrow and outdated view of what sustainability is and how the built environment can contribute towards its attainment. Energy conservation through passive and active solar strategies is close to being the sole concern. Moreover, it draws emphasis on the individual building and is oblivious

of the fact that the latter is not an object in its own right but the increment of development of the modern Greek urban fabric.

Action for the Environment

In response to their commitment to *Agenda 21*, four Municipalities and an Association of three Communes of Western Thessaloniki created the *Action for the Environment: a Programme for Sustainable Development of the Municipalities of Western Thessaloniki* (Municipality of Stavroupoli et al., 1996). The *Programme* formed part of the European initiative ECOS which aimed at encouraging collaboration and exchange of information and best practice among European local authorities, with respect to issues of urban sustainability. Local authorities of Western Thessaloniki, thus, formed a network with four boroughs of Greater London (Islington, Hackney, Haringey and Hammersmith) and four Municipal Departments of the city of Budapest.

The Municipalities of Western Thessaloniki are adjacent to the city's major industrial concentrations and, hence, suffer from atmospheric, land and water pollution more than any other area of the conurbation. This is also the area where lower-income populations tend to live. Extensive areas of unauthorised settlements, built mainly during the 1960s and 1970s, produced an area wanting in social and physical infrastructure and in operational links with the rest of the city. The *Programme* presents a comprehensive overview of the environmental situation of Western Thessaloniki. Subsequently, it proposes directions for action in response to the vital operational problems of the area like atmospheric pollution, industrial waste, incompatibility of land uses, etc.

The *Programme* is a product of collaboration at local and European level, co-ordinated with an international initiative (*Agenda 21*). In a typically fragmented and bureaucratic manner, however, it is not co-ordinated with initiatives concerning the future development of Thessaloniki as a whole, the *Strategic Plan* included. This lack of co-ordination reduces the *Programme's* potential to small scale interventions. The urban fabric is discussed as lacking cohesion, amenities and open spaces. Directions towards sustainability of the fabric refer to implementing existing General Urban Development Plans, recovering and utilising abandoned industrial land, increasing green space, pedestrianising streets etc. Without denigrating the value of such proposals, it is to be feared that they represent piecemeal interventions of local effect and do not challenge either the management process of the area or its degraded position in the conurbation.

5.4. Driving Forces of Thessaloniki's Unsustainability: Form or Process?

This Chapter employed two different metaphors / tools in order to identify the specific context of the city of Thessaloniki and, hence, disclose the driving forces of its unsustainability.

The first tool illuminated increasing detrimental effects on the immediate and the surrounding environment of both the energy flows and the material cycle of the city. In terms of its contribution to global environmental problems, Greece in general and Thessaloniki in particular are, comparatively, low energy consumers and CO_2 producers. However, they show steady increase in both indicators, as well as a disproportionately acute problem of urban atmospheric pollution. The latter is related, among other issues, to the high density of the fabric which reduces opportunities for traffic management and urban greenery and is responsible for high concentrations of pollutants to the lower strata of the atmosphere. In addition, uncontrolled mix of land uses is responsible for high levels of industry-related pollutants in the Western part of the city, which is adjacent to the city's biggest concentration of industries. The above features of the fabric of Thessaloniki, often promoted as facilitators of sustainability in the current discourse on urban sustainability, are also associated with issues of social equity, as, for example, lower-income inhabitants of the West of the conurbation are much more affected by industry-related pollution than those living in the East who also tend to have higher-incomes. Combined with marked homogeneity, low construction and design quality and lack of environmental considerations, the fabric becomes an important 'multi-factorial' component of the 'urban ecosystem' affecting its economic and cultural potential as well.

Several bodies in several sectors and tiers of public administration are responsible, in a fragmented, unclear and often overlapping way for the operation of the 'urban ecosystem'. The case of monitoring and abatement of atmospheric pollution is revealing, in this respect. Despite the technical expertise and the respective national and European legislative framework promoting it, there is neither a reliable image of the city's ambient air quality nor a comprehensive and integrated programme for its improvement. Addressing the constituents of this very inefficiency of the city's management is more crucial than elaborating on technical solutions.

To sum up, looking at the 'urban ecosystem' of Thessaloniki has shown that the detrimental effects of its operation lie in:

- increasing consumption of energy from non-renewable sources, use of cars, consumption of water and production of waste,
- some of the above interacting with adverse features of the fabric, and
- inefficient and fragmented management of the above.

The second tool/metaphor, Thessaloniki as an 'object of planning', disclosed another key issue of the city's unsustainability. Official plans aiming at controlling the city's development, despite their concern about environmental protection and more recently about sustainability at the urban and global level, have not had any significant transformative impact on it. The reason suggested for this failure is that plans failed to address two of the operational problems mentioned above, i.e. the multi-factorial role of the fabric and the inefficiency of management. In other words, official planning in Greece in general, rather than emanating out of specific circumstances of form and process, seeks to emulate Western European planning traditions and, hence, remains detached from the reality it attempts to confront. Predictably, all plans focus on the whole city, the neighbourhood or the individual building and tend to ignore the level of urban architecture, i.e. the way the fabric of the city develops and operates.

Combining the two tools it becomes obvious that Thessaloniki's unsustainability is driven both by its strictly physical features and by the processes that produce and reproduce them. A proposal that tries to solve one without addressing both is destined to remain just that.

In conclusion, Thessaloniki, presents a different case of urban unsustainability both in its physical forms and in the processes with which it operates and develops, than that identified by the urban sustainability discourse. This case can be categorised together with most Southern European cities with whom it shares many of its developmental and physical characteristics. The need to recognise Thessaloniki's, and every city's, specificity and use it as a point of departure in planning its move towards sustainability, rises as crucial in view of the sustainable cities discourse which sets the city in a global context and tends to assume commonality of problems. European plans for urban development, for instance the *Green Paper of the Urban Environment,* based exclusively on West and North European evidence, make the need particularly urgent for the case of Thessaloniki and other cities of Southern Europe.

chapter six

CHAPTER 6

'URBAN CONFIGURATIONS' AS THE APPROPRIATE SCALE

6.1. Introduction

Having identified the driving forces of Thessaloniki's unsustainability, Chapter 6 seeks to establish the scale, or scales, at which intervention towards sustainability can be meaningful. This is done in accordance to the second step towards urban sustainability suggested in Chapter 4, namely appropriateness of scale.

The previous chapter identified physical characteristics of the fabric of Thessaloniki among the driving forces of the city's unsustainability. In this context, the term urban fabric denotes the spatio-temporality of the built space of the city as it has developed incrementally to date. The focus is neither on buildings and areas of historic interest nor on monuments nor on civic buildings. It is, rather, on the bulk of built space that forms the overwhelming and highly insensitive background for these isolated 'urban landmarks'. Notwithstanding the prevalence of this anonymous background in the city, it has received the least interest by urban planning in Greece and, arguably, by urban planning, in general.

The urban fabric is not a completely homogeneous formation nor is it one with infinite and unpredictable variance. In Thessaloniki, apartment buildings, which do exhibit a high degree of homogeneity, reflecting a repeated process of production, constitute the 'building cells' of the fabric and combine with each other in a limited number of ways creating different 'urban configurations'.

It is argued that, although all three scales of intervention, prevailing in the sustainable cities discourse, are relevant to Thessaloniki, focus on the intermediate scale of 'urban configurations' can be of catalytic significance in the process of transforming the fabric and the city towards sustainability. The above is argued on the basis of the environmental, social and economic issues that emerge at this scale and often have consequences of an urban scale.

Rickaby [in Hawkes (ed.), 1987, pp43-61], Matthews [in Hawkes (ed.), 1987, pp29-41] and Steemers et al. (1996) have drawn emphasis on the scale of configurations of urban buildings rather than the individual building. Their research on the energy demand of different configurations can be a valuable contribution to the discourse of

urban sustainability. In order to be instrumental in real change, however, it needs to be fed into a wider framework that is sensitive to the processes that produce the forms, on the one hand, and to the effects they have on the wider urban environment, on the other.

Energy demand is not the only factor that is affected by the way individual buildings are combined with each other to form the urban fabric. It is argued that, issues related to the environmental, social and economic sustainability of the whole city are also affected. Resolving the forms and linking them to equivalent processes that could transform the urban block towards sustainability could initiate the transformation of the whole urban fabric and influence the operation of the 'ecosystem' of Thessaloniki.

6.2. Relevance of the Established Scales to Thessaloniki.

Employing the concept of contextuality as the first step towards sustainability of Thessaloniki revealed the futility of the search for universally valid models of sustainable cities, in general, and sustainable urban forms, in particular. Simply put, Thessaloniki does not feature the social patterns and environmental characteristics that are addressed in most models of sustainability. This section examines the relevance of the three scales of focus - whole city, neighbourhood, individual building - prevailing in the discourse to the specific urban context. All three are found pertinent to the problems of Thessaloniki. It is argued, however, that, focus of analysis and intervention on these scales exclusively is bound to leave significant processes unrecorded and, thus, important opportunities for change unexplored.

In theory, urban policy in Greece has attempted to control the development of the city as a whole, to organise it in revitalised and semi-self-sufficient neighbourhood units and to improve the shell and performance of individual buildings. In practice, however, only the latter scale of reference has been widely influential to the image and function of Thessaloniki.

6.2.1. The Whole City

Looking at Thessaloniki as an 'urban ecosystem', a number of physical processes and features emerged as needing major redesign in order for the city to approximate a 'cyclical' operation similar to that of a natural ecosystem. This imperative becomes evident, on the one hand, when investigating the evolution and current trends of these processes and, on the other, when examining the effects of their mutual interaction and of their interaction with the physical and social circumstances of the specific city. It is

true to say that, seen in the context of the developed world, Thessaloniki exhibits low levels of contribution to global and transboundary environmental issues. However, comparative analysis of absolute measurable features e.g. number of cars per capita, is often futile, as the same values may have different effects in different contexts. For instance, the number of cars per capita in Thessaloniki may be very low compared to the North American figure. Nevertheless, cars have a strong effect on urban atmosphere in Thessaloniki as they are old and move slowly in conditions of congestion and through a densely built fabric with very few open spaces. Moreover, most vital operational processes of Thessaloniki constantly increase their effects on the local and global environment and, hence, the city on the whole appears to move away from sustainability, rather than towards it.

Focus on the whole of the city and its relation to its immediate and wider region is, therefore, essential in order to identify unsustainable trends and, hence, begin to reverse them. The ecosystem metaphor revealed the need for a comprehensive and integrative study of both the energy flows and the material cycle of Thessaloniki. The latter involves primarily energy, transport and atmospheric pollution management. The former involves solid, domestic and industrial waste and water management. Both the *Master Plan* and the *Strategic Plan of Thessaloniki* identify the city a whole placed in its region by the former and in its European and global context by the latter. Land-use planning at the level of the whole city is also supported with a view to eliminating detrimental proximities of industry and residence and containing industry in specially designated zones.

The metaphor of the ecosystem, however, also showed that in order for the above 'redesign of the city's metabolism' (Girardet, 1992) to begin, a major redesign of the city's administration needs to take precedence. As cities are not self-regulatory and depend on a series of levels of administration, the function of this 'administrational ladder' also needs to be 'redesigned', with emphasis on communication and subsidiarity among the different levels. This is particularly true in Greece where administration is highly centralised and local authorities have limited and unclear agendas.

For example, one of the recurring issues in the discourse of sustainable cities is energy management at the urban level. As already discussed, electric power in Greece is produced and distributed centrally for the whole country by a special public utility company. The monopolistic nature of the Public Power Corporation limits

opportunities for energy production from renewable sources which are locally produced and distributed at a small scale. It would, therefore, be unrealistic to plan energy management for Thessaloniki before 'redesigning the administrational ladder' at a national level. A 'nested network', 'tapping the potential for vertical and horizontal integration' (Carley and Christie, 1994, pp197-201) is required to establish links between the national, the urban and the individual household, to overcome organisational hindrances and co-ordinate the various tiers towards the common goal of energy conservation.

Furthermore, European Union laws and directives and Greece's commitment to international treaties need to be taken into account in this administrative redesign. In other words, the city does not contain the solutions to its problems. Studied in a holistic way, the city reveals dysfunctions in its operation which, in order to be addressed require co-ordination with many more scales of focus, both wider and narrower than that of the city.

6.2.2. The Neighbourhood Unit

Notwithstanding the ambitious beginning of Thessaloniki's planning history and the post-war attempts to control its development, the city grew without reference to a comprehensive plan and extended its limits through unauthorised settling rather than by planned extensions. Whether within or outside the legal urban plan, the increment of development has been the individual urban plot. Apart from the dysfunctions of the city as whole, this lack of effective comprehensive planning resulted in areas which lack basic social amenities, open spaces and identity in their physical and social fabric. Therefore, intervention at the level of the neighbourhood is also a necessity for Thessaloniki.

The level of the neighbourhood was introduced vigorously in Greek urban planning by Law 947/1979, later modified to Law 1337/1983. These laws also introduced mechanisms for land and money contribution by landowners[1], with a view to providing adequate land and a percentage of funding for public spaces and social amenities to extensions of approved city plans. In effect, these were the first laws that attempted to substitute urbanisation based on the concept of the neighbourhood as the

[1] The first law (947/1979), which was introduced by the government of the right wing party (New Democracy), introduced a flat rate of land and money contribution, regardless of the size of the plot. This obviously favoured big landowners and disenfranchised the small ones. Soon after, in 1981, the socialist party (PASOK) was elected in government, and introduced the second law (1337/83) which modified land and money contribution to one escalating according to the size of the plot.

increment of development, for the pattern of urbanisation that had hitherto produced Greek cities, i.e. development of small individual plots. Both laws drew inspiration from European and North American planning traditions, which they introduced in an economic and social environment that was not ready to accept them and an administrative structure that was not able to implement them (see Hastaoglou et al., 1987, pp167-173). So far, the effect on urban environments of what was conceived as a massive reform of urban policy has been minimal. On the one hand, it has hardly been implemented, and on the other, successive modifications have diluted its original transformative intentions.

As mentioned earlier, the *Master Plan of Thessaloniki* promotes a polycentric structure for the city, i.e. it promotes the model of 'decentralised concentration' (see Chapter 3). The *Master Plan* calls for strengthening the attractiveness of existing satellite villages by introducing new urban amenities. Existing urban areas should also be organised in neighbourhoods.

Enhancement of neighbourhood identity is among the aims of one of the *Strategic Plan*'s sub-programmes, too (Ministry of the Environment et al., 1995, pp175-176). This sub-programme hopes that identification and promotion of 'every trace of historic, and not strictly historic, particularity of every urban area...as potential cultural and economic agents, will have a revitalising effect and will mobilise forces (social and economic)...'. Features of the building stock, the street plan or the local history and topography, 'everything apart from apartment buildings', can have this regenerative effect to the fabric and its local community. Thus, the *Strategic Plan* recognises the importance of the physical fabric to invigorating, not only the city's image, but also its social and economic function. It is, nevertheless, noteworthy that the anonymous, mass-produced fabric, virtually exclusively consisting of apartment buildings, is seen only as having caused 'elimination of the special character of urban areas, with negative operational, environmental, aesthetic and socio-cultural consequences', and not as containing any potential. A corollary to the latter is that, there are no suggestions as to how the processes - economic, social and regulatory - that are incrementally reproducing the fabric, could be transformed to produce a more sustainable one.

Thus, the *Strategic Plan* reproduces the well-established dual approach to the city. On the one hand, urban planning amounts to two-dimensional maps designating land uses, development rights, street plans, infrastructure and approved extension limits,

created specially for each city. On the other, building regulations and construction standards set, homogeneously for the whole country, the rules of how every city's physical fabric, its third dimension, should develop, focusing mostly on protecting private property and public space rather than on inducing incrementally an envisaged urban form or performance.

6.2.3. The Individual Building

Indisputably, the individual building has received the lion's share of attention of Greek urban planning. Furthermore, legislation regarding the individual building is the only level of urban policy that has been widely, though not accurately, implemented and, thus, it has had the strongest influence on the image and operation of Greek cities. Starting as early as 1918, with Hebrard's Plan of Thessaloniki, which ceded the right to develop to individual plot owners, emphasis on the individual plot reached its peak during the dictatorship (1967-1974). During that period, successive increases of development rights aimed, not only at covering the pressing housing needs of country-to-city immigrants but, also at boosting construction and the growing industry related to it (cement, steel, aluminium etc.) and control urban unemployment. Although investment in building construction has been often labelled 'unproductive', as opposed to productive investment in industry, it can be argued that the Greek 'economic miracle' of the 1960s was thrust by intense building activity in cities during that period, rather than by industrialisation (Leontidou, 1990).

Following the dictatorship, for the first time, in 1979, plot ratios were reduced and standards of construction were raised with the introduction of regulations regarding thermal and acoustic insulation, fire protection, natural lighting and central heating. The *Action Plan: Energy 2000*, as presented in Chapter 5, is the most recent attempt to improve individual buildings further by introducing energy concerns into the General Building Code (GBC), although it does not, as yet, have any legal force.

In short, the fabric of the city of Thessaloniki has been primarily shaped by choices, institutional, economic and political, that used the small urban plot as their basic level for reference. The repeatedly modified GBCs, marginally or inaccurately implemented have had the greatest influence on the fabric. The smallness of plots and the often excessive plot ratios permitted, for political, social and economic reasons, engendered high levels of interaction between individual buildings. GBCs consistently did not regulate for this interaction and left it to operate increasingly at random. In other words, they failed to account for buildings as parts of 'urban

configurations'. Thus, they also, failed to account for 'urban configurations' as parts of the urban fabric.

6.3. Environmental Performance of 'Urban Configurations'

The way urban buildings combine with each other to form the urban fabric varies considerably across different cities as well as within the fabric of the same city. Accordingly, interaction between urban buildings, in physical, social and economic terms varies from the maximum exhibited in high density central urban blocks to the minimum manifested among detached suburban houses. However, density is not the only factor determining their function.

Although, urban sustainability discourse has marginalised the role of this scale of focus, interaction between buildings has been found to affect considerably their energy demand as well as the environmental performance of a city as a whole. Most relevant research emphasises the former rather than the latter.

Rickaby [in Hawkes (ed.), 1987, pp43-61] proposes 'incremental redevelopment' of the urban fabric towards energy efficiency through more energy-efficient configurations of buildings. In order to identify such configurations, Rickaby begins by investigating ways of assessing existing ones. He identifies the factors that affect energy demand of a central urban block. They are the following:

- shape
- size
- orientation
- width of the street
- position relative to neighbouring blocks
- overall form
- mix and disposition of floorspace and built space
- thermal characteristics of the fabric and
- the pattern of occupancy.

Rickaby seeks indicators that give information regarding the thermal performance (solar gains and heat losses) of different shapes of urban blocks[2]. He highlights, however, the partiality of the above indicators and the need to combine them with

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[2] One indicator examined by Rickaby is the ratio of the solar exposure of the block in summer and in winter. The ratio of direct solar exposure divided by the overall surface of the block and the summer values of that divided by the winter values are two more indicators of efficiency depending on shape. [Knowles, 1974, quoted in Rickaby, in Hawkes (ed.), 1987, p].

those describing other factors. An indicator of energy efficiency related merely to shape, e.g. the ratio of floorspace to surface area of a block, does not take into account the thermal properties of the fabric which also affect, albeit to a lesser extent, the heat losses of the block. In addition to the physical characteristics of the block, the arrangement of the different uses in space and time affect energy efficiency. Rickaby introduces the energy dimension in land-use at the level of the block. Different uses have different heating demands, heat gains and lighting needs. Taking these energy characteristics into account can produce a mix of uses that takes advantage of their synergistic potential. Furthermore, 'the matching of demands and supplies both in quantity and in time' can increase the viability of local heat recovery and district heating systems, making the fabric even more efficient. A mix of offices and shops with residences would be convenient in energy terms, as the former are mostly heated during the day and the latter during early morning and evening. Thus, peaks in energy demand can be avoided (p59).

Linking occupational and physical characteristics, Rickaby produces the most comprehensive account of energy-related issues at the scale of the urban configuration. Even more important are the links he identifies between the urban block and the whole urban system, and vice versa. He suggests (pp59-60) that controlling the mix of uses in every urban configuration with a view to energy efficiency can affect the energy performance of the whole city as it may influence densities and pattern of travel. The reverse can also become an objective: choices at the regional level may inform the form and performance of urban configurations. Thus, Rickaby introduces the scale of the urban configuration as a potential 'Archimedian Point' [Yanarella and Levine, in Breheny and Hall (eds), 1992, pp301-312] for the transformation of urban form towards energy efficiency. Nevertheless, urban sustainability, as it has been defined in Chapter 2, has a much wider scope than reducing energy demand.

Steemers et al. (1996, pp331-336) focus on the geometry of different 'urban arrays'. As part of a Project of the European Commission entitled *Towards Zero Emission Urban Development*, they examine the effects of geometric characteristics of 'urban arrays' on the urban microclimate as well as on the energy demand of the 'arrays'. Through physical modelling in wind tunnels, Steemers et al. display the influence of different normalised geometrical forms on wind conditions at ground level as well as on the dispersion patterns of pollutants. Among the six generic forms (figure 6.1) that they tested, pavilions were found to be the most efficient in dispersing pollutants particularly when the wind blows at 45^0.

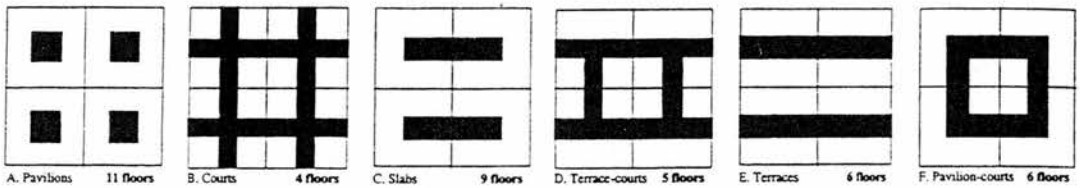

Figure 6.1. The six generic urban forms tested for their environmental performance by Steemers et al. (1996, p332)

The annual incident solar radiation received by the same six generic forms was also calculated with a view to assessing their varying potential for passive solar design and their appropriateness for different climatic conditions. The court form was found to be most appropriate for hot climates as it receives the least solar radiation on its vertical surfaces. It is not surprising, therefore, that this form has been extensively used in vernacular settlements in hot regions. Steemers et al. aim at quantifying geometric characteristics of different 'arrays' in real urban situations and try to map their effects on urban microclimate and urban energy demand. For instance, one such quantified characteristic is the 'blocking effect' of buildings at a given direction in order to examine its relation to wind conditions at ground level and hence their effect on human comfort. Through this analysis, the *Project* intends not only to assess the fabric's current performance but also to prescribe informed interventions.

Leslie Matthews has also identified the need for addressing energy issues at the scale of the urban block [in Hawkes (ed.), 1987, pp29-41]. He developed a computer based method designed to take into account the variety of physical, energy and occupational characteristics of buildings that form an urban block, in order to predict their seasonal energy demand.

Rickaby, Steemers et al. and Matthews establish the importance of the scale of urban configurations to the energy demand of the urban buildings, the local microclimate and, hence, human comfort. They also affirm the potential of this scale of focus to act as the point of departure for a gradual transformation of the urban fabric towards energy efficiency. Rickaby and Matthews exhibit the complexity and interdependency of all issues relevant to this scale and the need for integrating features of different nature. Conversely, Steemers et al. focus on geometric features only.

Approaches to urban form examined in this section challenge the exclusivity of the three crystallised scales of focus towards urban transformation, examined in Chapter 3. They display the significance of an intermediate scale of focus and intervention. They do that, primarily, with regard to energy efficiency, which, albeit significant, is not the only issue at stake towards sustainable urban form. Issues of economic and social sustainability acquire meaningful presence at the scale of urban configurations and could influence the respective performance of the whole fabric. Urban configurations are approached as having physical functions only. This is particularly evident in Steemers et al.

Finally, repeating a constant limitation of most proposals aiming at sustainable urban form, analyses of the scale of the block with regard to energy demand approach the block as an object disconnected from the processes that produce it. Reference is made to land use planning and issues regulated by building regulations. The effect of economic and social factors in the production of each block is left unacknowledged. Isolation of physical forms from their shaping processes may be legitimate as a basis of scientific analysis, given the complexity of the urban system. It is essential, however, that analysis of physical forms is introduced to, and juxtaposed with, analysis of their non-physical context, in order to improve understanding of the urban fabric and facilitate its transformation towards sustainability. Analyses of physical urban forms need to become an input to a broader framework of analysis, if they are not to remain 'secure reifications that conceal rather than reveal the fluid processes at work' (Harvey, 1985, pxvii).

6.4. 'Urban Configurations' as Multi-factorial Components of the Urban System.

The validity of focusing on the level of urban configuration with a view to increasing energy efficiency and improving microclimate is established by scientific research. This section seeks to establish its validity as a level of focus for a more comprehensive transformation; that of the city of Thessaloniki towards sustainability. It studies 'urban configurations' as multi-factorial components of the urban system.

Multi-factoriality, in systems theory language, is defined as:

> The ability of a system component to serve both in a control function (causing change in other component) and in a dependent function (being changed by another component) (Clayton and Radcliffe, 1996, p26)

Urban Greek policy has barely addressed the dependent function of urban configurations and has completely overlooked their control function.

6.4.1. Dependent function

Urban plans and building regulations have not tried adequately to control the scale of urban configurations making only occasional references it. These references treated urban configurations mostly as a potential scale for urban regeneration rather than one wanting control and regulation on the outset of the urban planning process.

The latest General Building Code (GBC), valid since 1985, introduced the concept of the 'active urban quarter' which aims at co-ordinating development of plots forming urban blocks or quarters, rather than developing each constituent plot individually (GBC, 1985, article 13). The concept can be employed either on an existing quarter as an instrument of regeneration or during the planning process before the quarter develops. The process of designating an 'active urban quarter' must be initiated by the relevant local authority after consulting the local Urban Neighbourhood Group or the Committee of the Quarter's Owners. The case has to be vindicated on the grounds of either conditions of social and/or environmental degradation or special morphological features e.g. listed buildings or open spaces forming part of the quarter. One of the modifications to GBC suggested by the *Energy 2000: Action Plan* is the possibility to designate 'active urban quarters' with a view to improving thermal performance of buildings, to creating a favourable microclimate or installing central heating systems for the whole block in the unified unbuilt space.

The concept of the 'active urban quarter' has remained virtually inactive until today. The reasons are many. First, the 'active urban quarter' has not been linked to the economic mechanisms that produce apartment buildings and which are relentlessly linked to small subdivided plots seeking maximum exploitation. In fact, as next chapter will discuss, it has been the very subdivision of urban land that has facilitated the development of the single economic mechanism which has produced the overwhelming majority of apartment buildings in Greece. Second, Urban Neighbourhood Groups and Committees of Quarters' Owners never materialised into effective institutions. In short, failure to implement 'active urban quarters' is attributed to the concept's detachment from economic and social reality of urban Greece.

In terms of regulation, urban configurations in Greek cities are formed as a result of a haphazard combination of the following:

- **General Urban Development Plans** for individual cities or municipalities which draw street plans and designate land uses, plot ratios and, formerly, building systems (continuous or mixed), extension boundaries and required infrastructure.
- **The General Building Code** which is valid throughout rural and urban Greece and determine the minimum size of buildable plot, permissible volume with respect to width of street, height and plot coverage, minimum distances from adjacent plots, and certain general morphological features of ground floor galleries and *pilotis*, in case they are required by specific urban plans.
- **The Building Construction Code** which designates minimum requirements for natural lighting and natural ventilation, passive fire protection, thermal and acoustic insulation, infrastructure networks (recently included compulsory provisions for future natural gas network) and general directions regarding the structure and constructional details of windows, staircases etc.

Notwithstanding the high degree of interaction between buildings observed in Greek cities, none of the above bodies of rules attempts to control, or take advantage of, the environmental social and economic consequences of the way buildings are combined to form the urban fabric. It is the central point of this section that, the Greek urban policy's lack of consideration of the dependent role of urban configurations is among the thrusts of unsustainability of the fabric of Thessaloniki. It is also a vital area of intervention towards change.

The city's institutional framework, however, does not operate in a social and economic vacuum and hence, it is not the only factor affecting the form and performance of urban configurations. Its interaction with social and economic processes is also significant, as next chapter will attempt to show comparing four urban configurations of the city of Thessaloniki. The unco-ordinated development of individual plots, rather than of whole urban configurations or quarters in Greek cities, is related to the national economic circumstances in which urbanisation occurred and the huge subdivision of land. The absence of public housing policy made private development of urban plots the only choice of housing, apart from unauthorised building in areas beyond the boundaries of the approved urban plan. In response to the above, the economic mechanism that created the majority of the building stock was

invented and its speculative nature determined the form and performance of the urban fabric.

The patronage system that conditions the relationship between the Greek state and the citizens has made increasing plot ratios of individual plots an enduring political asset towards re-election. Furthermore, breaching of building and planning regulations has been extensive and, generally, tolerated by the state as building construction worked as a thrust to the economy of the country. Lax development control has affected the form and operation of urban configurations creating, for example, built-up court spaces and buildings protruding at various heights above the legal height of the configuration. The above features of Thessaloniki's economic and social processes have left their imprints on the physicality of the city's configurations.

6.4.2. Control Function

The control function of 'urban configurations' is also environmental, social and economic. It affects, on the one hand, the performance of individual buildings, i.e. the constituent parts of urban configurations, and on the other, the performance of the whole of the urban system. Nevertheless, both these functions of urban configurations have been left unrecorded by urban policy and, hence, their effects have not been exploited or controlled. The purpose of this section is to expose the effects of this dual control function of urban configurations.

There is no consensus with regard to what sustainable architecture means. The various interpretations of the broad and integrating concept of sustainable development are reflected in the practical proposals towards its implementation. Thus, different aspects of the concept are brought to the fore by different proponents of 'green', 'ecological' or 'environment-friendly' architecture. Broadly speaking, architectural practice which would be consistent with the 'global goal' would have the following concerns:

- to protect the local and global environment from adverse impacts emanating from construction, design, operation or demolition of the building;
- to conserve global natural and man-made resources for future generations (futurity);
- to enhance social equity; and
- to promote economic development in conventional economic terms.

Means of implementation of these goals have been widely researched for the individual building since the previous outbreak of environmentalism and particularly since the energy crisis of the early 1970s. In most developed countries, research has been already translated to public policy, fed into building regulations or the fiscal system. However, it is true to say that, the different strands of sustainable architecture tend not to make any distinction between urban and greenfield architecture. Thus, the constraints and opportunities that the urban context creates are not accounted for. In fact, most of the above goals of sustainable architecture are affected by the way buildings combine with eachother and, hence, in an urban context, cannot be pursued effectively on the basis of the individual building. The extent to which they are affected is a function of the density of development and the mixture of land uses of the city. It is also related to the social processes and economic mechanisms that produce the urban fabric in different urban contexts.

With regard to the first goal of sustainable architecture, the environmental performance of each apartment building, i.e. its passive qualities, energy consumption etc., is affected by the way it combines with other buildings, whether for example they form a court, or an array of detached buildings. High densities of development in Thessaloniki increase interaction between individual buildings and hence the effect on eachother's environmental performance. In addition, combination of different land uses in an urban configuration affects the energy performance of its constituent buildings. Interaction, in terms of energy between different urban uses, is particularly relevant to Thessaloniki where in most central urban blocks, ground and lower floors are occupied by shops, workshops and offices and the upper floors by residences. The energy repercussions of this relationship have not been explored.

Finally, the feasibility of installing efficient heating systems for the whole of the configuration and the degree of energy conservation achieved is also affected by processes which emerge at the level of the urban configuration. Combined Heat and Power (CPH) plants are considered the most efficient solution for densely built urban environments as they can achieve approximately 30% savings and can operate in variety of scales down to a lowest limit of 10KW (Bell et al., 1996, pp34-36). They are widely used in Denmark and Sweden. In Greece, the piecemeal and un-co-ordinated mode of urban development combined with a monopolistic system of energy production and distribution have impeded the development of such systems. A process of overcoming these impediments could begin by analysing the energy potential of urban configurations and directing their future development accordingly.

Some commonly used indicators of individual buildings' performance which are directly affected by their relationship with other buildings are:

- surface to volume ratio (S/V) (Steemers et al., 1996, pp331-336, Hawkes, 1981, Knowles, 1974, etc.),
- solar gains and access to natural lighting [Steemers et al., 1996, Hawkes, 1981, Knowles, 1981, Rickaby, in Hawkes (ed.) 1987, pp43-61, BRE, undated],
- Gains to Losses Ratio (GLR) (Yannas, 1994, p21),
- solarity (ratio of south facing to total glazing),
- passivity (ratio of passive to total area)[3],
- obstruction angle or Urban Horizon Angle [4],
- microclimate (Steemers et al., 1996),
- opportunities for central heating systems and CHP,
- subsidiarity among different uses in terms of energy [Rickaby, in Hawkes (ed.), 1987, pp58-60].

Social objectives of architecture can also be conditioned by the way individual buildings combine with each other to form the urban fabric. The mix of different land-uses endorsed as a sustainable characteristic by most proponents of the self-sufficient neighbourhood unit, can be promoted at the level of urban configurations to encourage social exchange and enhance economic vitality. This would be the minimum, closest to the users and owners, and, hence, most dynamic scale for such a pursuit and could work in a subsidiary way with larger scales. Also, access to and use of the common space created between buildings can have an impact on the quality of life of the inhabitants and enhance community identity and participation. A common space, that is the product of co-ordination with a specific mandate for sustainability, and not the haphazard residue of individual private development, can be also used to create a favourable microclimate, enhance views and solar access for the surrounding buildings. All the above have bearing on the economic value of individual buildings.

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[3] In the LT Method passive areas are defined the zones of the building that can be lit and ventilated naturally and can make use of solar gains for heating. For a building with normal ceiling of 3m, the depth of passive zones is calculated at 6m from external walls with windows (LT Method 1.2).

[4] Solarity, Passivity and the Urban Horizon Angle are indicators of a building's energy efficiency introduced in the LT Method for calculating energy requirements of buildings of several uses and geographical areas. The LT has been developed at the Martin Centre in Cambridge as part of a Commission of the European Communities project (see Chapter 7, pp1187-188).

Therefore, in order to transform the densely built fabric of Thessaloniki towards an environment-friendly performance, it is not pertinent to aspire to a 'bottom-up' change initiated by un-co-ordinated experiments on individual apartment buildings. It is not enough to inform the General Building Code (GBC) with regard to passive and active solar energy strategies or controlled microclimates for individual buildings. Finally, change cannot be initiated by comprehensive General Urban Development Plans, as relations between buildings fall beyond their scope.

The control function of urban configurations on the city as a whole are also environmental, social and, indirectly, economic. The way buildings combine with eachother may affect, in environmental terms:

- the energy balance of the city as a whole
- atmospheric pollutants' dispersal patterns (street canyon)
- the urban climate
- the microclimate of the street
- the city's 'imageability'
- the mixture of land-uses

and in terms of social and economic process:

- the economic function of the city
- its social cohesion
- its identity and
- public life.

In the case of Thessaloniki, the concept of the neighbourhood is too abstract and bureaucratically invented and that of the whole city is too big for some of Lynch's 'performance dimensions', like 'control' or 'manipulability' (Lynch, 1981, see Chapter 4) to have meaning. Even when institutionalised by Law 1337/83 (see Chapter 7), public participation at the level of the neighbourhood has not been activated and its effect has been minimal. The lack of credibility of official urban planning and its long lasting ineffectiveness may explain the public's reluctance to participate. Conversely, direct personal interest of owner-occupiers, as well as the perceivable potential of change at the level of urban configurations can work towards enhancing community sense and genuine participation. Thus, urban configurations can play a role towards creating 'a good city' by offering the minimum meaningful level of reference; not one that can operate on its own, but one that can initiate change, form a sustainable increment of development and a sustainable module of urban regeneration.

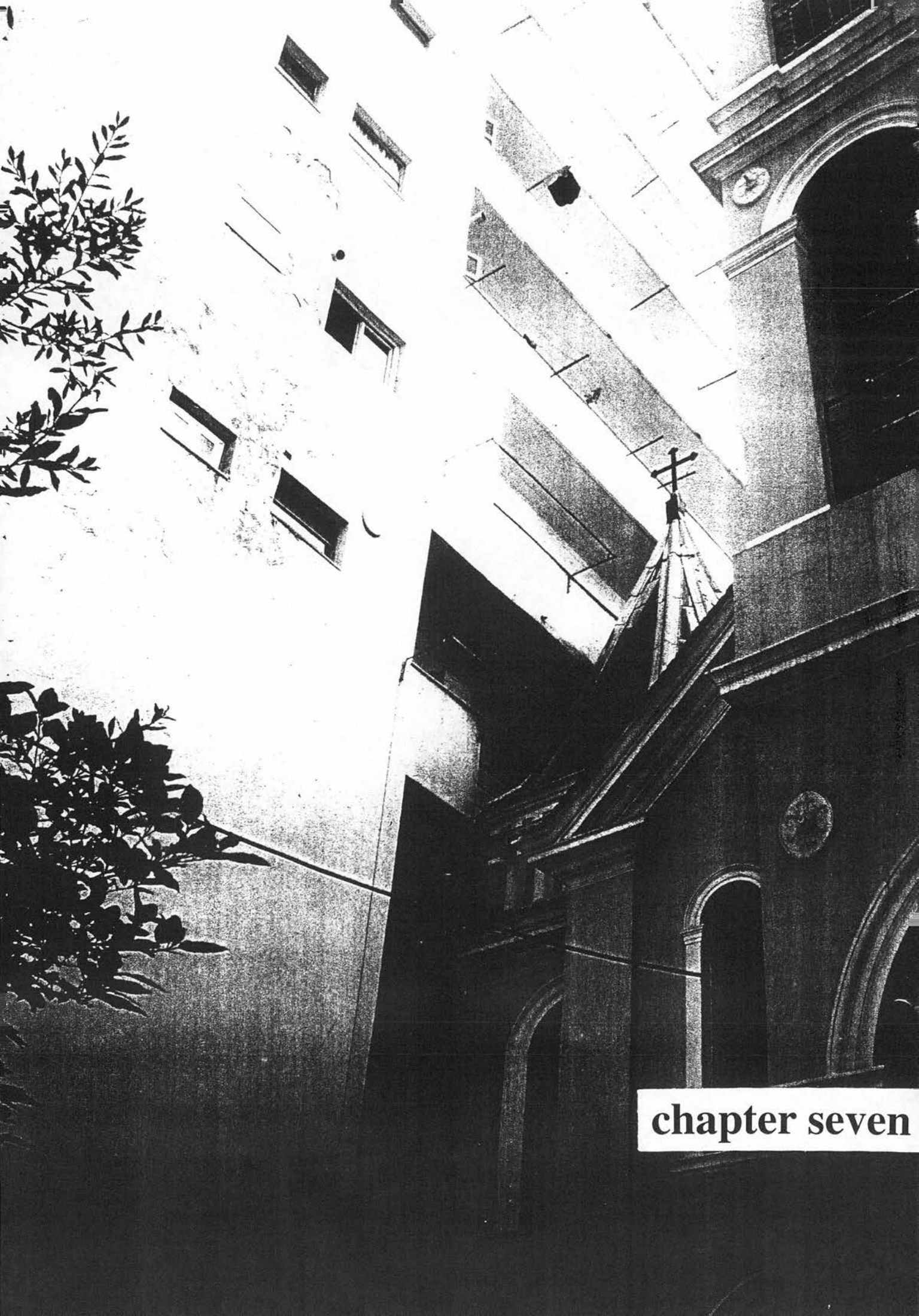
The scale of urban configurations is suggested as pivotal to analysing and intervening upon the urban fabric of Thessaloniki. The significance of this scale stems both from characteristics of the city's physical form as well as of its shaping temporal processes. In terms of form, the high densities in which the city is built and the high mixture of land-uses increase interaction both between constituent apartment buildings and between buildings and public space and the city as a whole.

In terms of process, the pattern of Thessaloniki's urbanisation creates this scale's potential contribution to the city's transformation. The enduring pattern of developing individual subdivided plots, exclusively by and for the private sector, and its role in the national economic and political scene makes the interaction of these increments of development the minimum and most dynamic scale of intervention towards sustainability. So far, the implementation of large-scale official urban planning has been minimal, while private over-development of individual increments has been the norm. The intermediate scale of urban configurations contains the potential of becoming a subsidiary to the former by co-ordinating the development of the latter. This scale's absence from the city's institutional framework of development testifies to the framework's detachment from reality and explains part of it ineffectiveness.

6.5. Concluding Remarks

The control function of the scale of urban configurations is left unnoticed by Greek urban policy. It is argued that, focus on this scale is essential if the intricate relations between form and human processes are to be decoded and, subsequently, operationalised towards a sustainable fabric for Thessaloniki.

Strictly speaking, as Chapter 1 tried to establish, sustainability has the globe as its ultimate field of reference. Action towards it, however, cannot be initiated exclusively at the global level. A multi-tier programme of actions, originating from, and referring to, several scales has to be orchestrated. This section seeks to show that the scale of urban configurations is, for Thessaloniki, the minimum meaningful scale of analysis and intervention towards urban sustainability and the city's contribution to the global situation. It is argued, that it forms the minimum scale in which all three dimensions of sustainability - environmental, social and economic - are substantially present both in terms of physical form and in terms of human processes.



chapter seven

CHAPTER 7

RECONCILING FORM AND PROCESS

7.1. Introduction

Chapter 7 presents an assessment of the physical fabric of Thessaloniki, with respect to sustainability. The scale of focus is the one identified in the previous chapter as crucial to the process of transforming the fabric, but as yet lacking adequate analysis and official control, namely that of 'urban configurations'. The assessment is pursued in accordance to the third generic step towards urban sustainability suggested in Chapter 4, namely the reconciliation of form and process.

The urban fabric is approached as a 'palimpsest', i.e. 'a composite landscape made up of different built forms superimposed upon each other with the passing of time' (Harvey, 1996, p417). In other words, it is approached as a 'spatio-temporal', rather than a strictly spatial formation, i.e. a formation that exists physically in space and is constantly shaped by processes in time (Harvey, 1996, p403-430). Thessaloniki has a long history and naturally there have been many 'superimposed' layers of urban forms, that have created its current fabric. Quantitatively, the fabric produced during the city's post-war development prevails. This chapter examines four different urban configurations that have been added to Thessaloniki's fabric during that period. Variations in these forms demonstrate physically transformations in the city's economic and social circumstances, in combination with changes in national planning choices and building regulations. To an extent, they also demonstrate changes in the stylistic preferences of local architectural practice and the local interpretation of changing international trends in architecture and planning.

No existing list of Sustainability Indicators is employed in this assessment. Firstly, because such lists tend to measure physical characteristics of the city, trends in its environmental performance or in its social and economic statistics without accounting for interaction between physical and non-physical indicators. Secondly, existing lists tend to evaluate the city as a whole, the neighbourhood or the individual building and neglect the scale examined in this chapter. Thirdly, and most importantly, sustainability indicators need to evolve out of the environment - physical and non-physical - which they are supposed to describe rather than to be imposed on it.

For each of the four configurations two groups of parameters are examined, namely those referring to physical form, and those referring to human processes. More specifically, the examined parameters of form are:

- the passive qualities of each configuration, i.e. its potential for passive heating, daylighting and passive cooling and ventilation, and its estimated energy requirements,
- the quality and energy intensity (embodied energy) of construction, and
- its urban image and function.

The parameters of process examined for each of the four urban configurations are:

- the regulatory framework directing and controlling its production,
- the social background, i.e. pattern and stage of urbanisation, population growth, state of urban economy etc.,
- the economic mechanism that produced its constituent buildings.

This assessment seeks to identify the processes that have shaped the fabric of Thessaloniki and the ones that are currently dictating its future development, and link them to the fabric's physical attributes. It is not comprehensive in its covering of either the physical or the temporal aspect. It does, however, present an image of the spatio-temporality of Thessaloniki's fabric and, thus, illuminates directions towards change that can inform the fourth step towards sustainability.

It is the central point of this chapter that identification and decoding of the relationship between the two groups of parameters is of pivotal importance both to the process of transforming the existing fabric towards sustainability and to planning a sustainable future development. Although no linear causality is assumed between the two groups, it is argued that, their relationship is inextricable. Most of the fabric's unsustainable features cannot be addressed and reversed, if the social and economic forces that facilitate their existence are not identified. In turn, no determinants of physical form, induced through building codes and regulations, can be considered either sufficient or appropriate to direct the transformation of the fabric towards sustainability and hence, none is prescribed in this thesis. Some prescriptive remarks, included in Chapter 8, refer directly and solely to one aspect of urban issues: the processes that produce the urban fabric of Thessaloniki and the way they interact with each other and with physical urban forms. In contrast to most current theoretical and practical expressions of the sustainable cities discourse, this chapter argues that, the potential of influencing

physical form and performance towards sustainability lies in redesigning processes and their interaction with urban physical form and not in dictating specific forms.

7.1.1. Four Urban Configurations

With respect to their physical characteristics, the four configurations examined represent a great share of Thessaloniki's current fabric. Nevertheless, they are individual 'spatio-temporal' events and cannot claim to present a comprehensive or average view of Thessaloniki's fabric. For instance, the extensive areas of low-rise unauthorised settlements in the city's immediate periphery are not accounted for in this assessment. Nor are the limited areas of detached houses of the city's high-income population. The examined configurations seek to illustrate specific, usually extreme, combinations of social, economic and institutional processes with physical urban space. To accomplish this, they are not normalised to match their generating legislation or established types of urban forms. Instead, they are examined in their actual state at the time of research (1997). There is a persistent gap between Greek regulatory frameworks and their respective physical forms. Ignoring this gap and examining normalised versions of the four configurations would have ignored a major shaping factor of Thessaloniki's fabric, namely breaching of building regulations, and its main drives.

All drawn from the city's 'authorised' fabric[1], these 'spatio-temporal' events, however, do trace a process of evolution in the institutional framework that directed the development of the city's fabric. They also represent four distinct periods in the city's pattern of urbanisation; from the intense development of its central core by people migrating from rural Greece, to the current trend towards suburbanisation. In short, the choice of the specific configurations was related to their representative value of both the temporal and the spatial dimensions of Thessaloniki. The examined configurations are (see figures 7.1. and 7.2):

1. the block of intense urbanisation,
2. the cluster of diffuse urbanisation,
3. the 'block' of economic restructuring, and
4. the suburban experiment.

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[1] The 'authorised', as opposed to 'unauthorised' fabric of Thessaloniki, is examined with a view to showing the evolution in the regulatory framework in which the fabric develops, its relation to socio-economic circumstances and physical urban forms. Later in this chapter it becomes obvious that building and planning regulations are not the only determinants of urban form.

Collecting information on the configurations involved research on their constituent buildings' applications for planning permission in Thessaloniki's Planning Authorities as well as research on relevant pieces of legislation. It also involved personal on site observations and research in the National Statistical Service and in existing literature on Thessaloniki.

Figure 7.1. The location of the four urban configurations in the city.

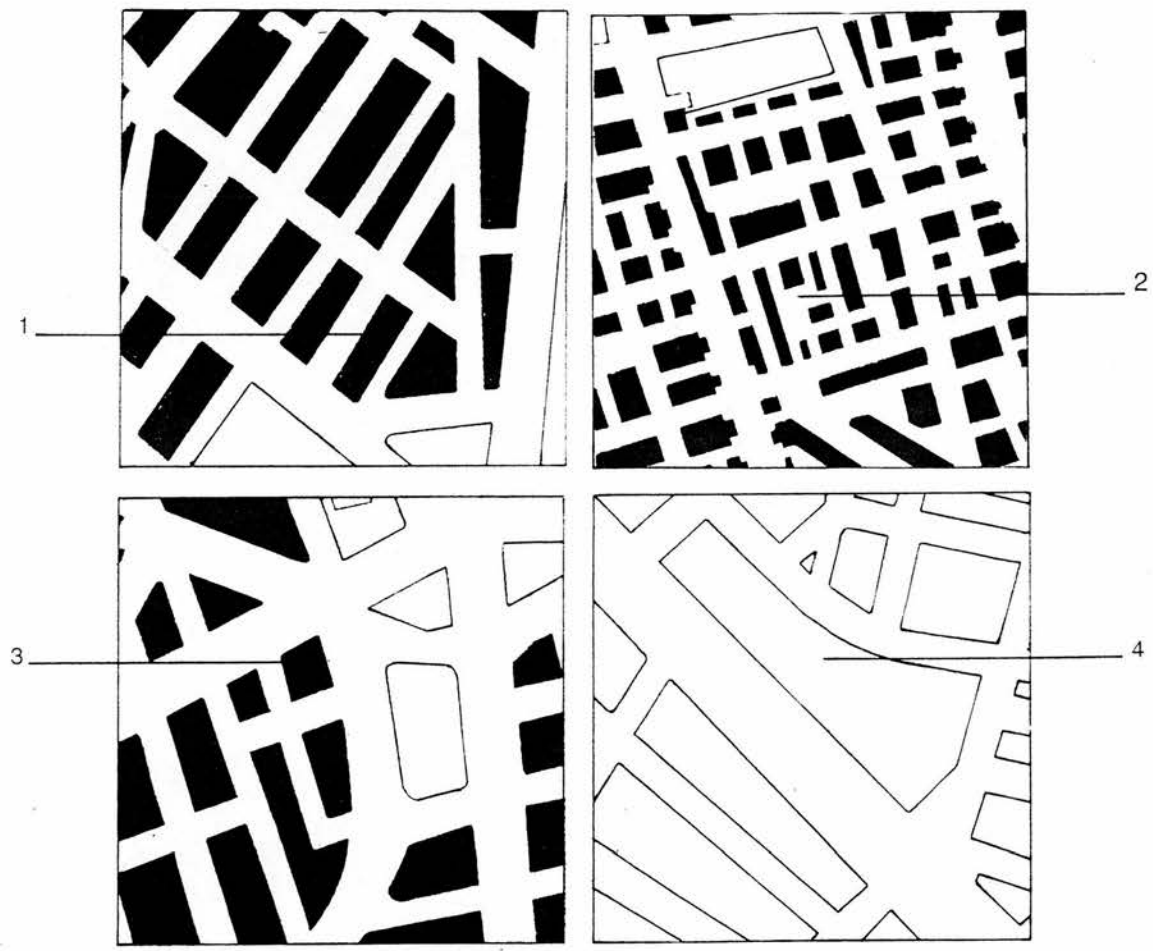

Figure 7.2. The four urban configurations

7.1.2. The LT Method

The LT (Light and Thermal) Method is used to provide rough estimates of the energy requirements of three[2] of the configurations. On the one hand, this is done with a view to investigating the effect a specific configuration has on the energy requirements of its constituent buildings. On the other, energy estimates are intended as a comparative study of the overall energy requirements of the three configurations.

[2] The energy requirements of three only of the four configurations are calculated, as the fourth, the suburban experiment, has not developed yet.

The LT Method[3] is a design tool created to help architects, early in the design process, evaluate the energy implications of various design possibilities. Its rough comparative, rather than accurate, nature makes it an appropriate tool for the purposes of this chapter[4]. It is also found appropriate because of its emphasis on geometric rather than constructional characteristics of buildings and, its resultant ability to reflect differences in energy requirements emanating from different building configurations. Finally, unlike most energy calculation methods, the LT provides estimates for the primary energy required for lighting, apart from heating and cooling.

The LT Method predicts primary energy consumption for lighting, heating, ventilation and cooling taking into account the following parameters:

1. local climatic conditions
2. orientation of facade
3. area and type of glazing
4. application of shading
5. occupancy and vacation patterns
6. lighting levels
7. internal gains.

The version employed in this Chapter is LT 3.0 which was created especially for Southern Europe. LT 3.0 does not account for obstruction. The correction factor for obstruction, the Urban Horizon Factor (UHF), was taken from LT for Non-domestic buildings (CEC, undated).

7.2. The Block of Intense Urbanisation

The Municipality of Thessaloniki is divided into five Municipal Departments. The first urban configuration examined in this chapter is situated within the precincts of the First (A') Municipal Department of the Municipality of Thessaloniki, which is the most central and still the most densely populated department of the conurbation.

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[3] The LT Method was created at the Martin Centre of Architectural and Urban Studies, University of Cambridge and Cambridge Architectural Research Ltd. for the Commission of the European Communities, Directorate - General XII for Science, Research and Development and Directorate - General XIII for Telecommunications, Information Technology and Innovation.

[4] Other methods for calculating energy requirements considered are *The Government's Standard Assessment Procedure for Energy Rating for dwellings* (SAP), (BRESCU) and *The Index Calculation Method* (Yannas, 1994). They both calculate only the energy required for heating and depend on characteristics of construction like insulation and airtightedness. SAP also depends on type of heating. The LT Method was found appropriate to highlight the differences that stem mostly from different configurations of buildings in space rather than their constructional and mechanical characteristics.

The block of intense urbanisation consists of seven apartment buildings and a church with its one-storey ancillary space. Six of the buildings are built continuously around an open court and one is separated from the rest by the church. Apartment buildings of this configuration were built within a period of eight years, between 1959 and 1967. The Armenian Church was built in 1902, and used to be a prominent building, before the development of the block.

7.2.1. Form

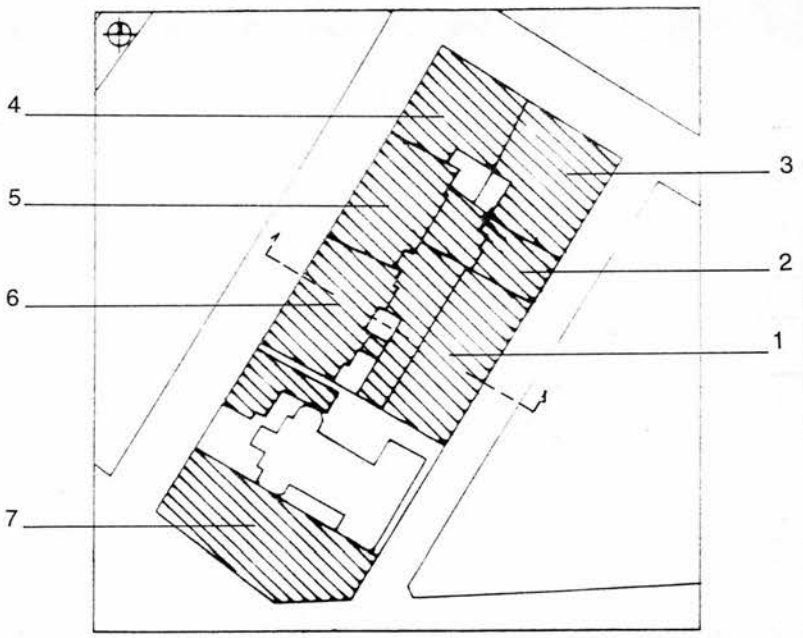

Figure 7.3 The block of intense urbanisation, scale 1:1000

The block is built on the Northeast-Southwest axis i.e. it has its long street facades oriented Northwest and Southeast. The four streets surrounding the block are 6, 8.5, 9 and 24 metres wide and, with the exception of the latter, are lined with blocks of the same features with the one examined. The height of the constituent buildings of this and the surrounding blocks varies from 7 to 10 storeys. Narrow streets lined with high buildings result in reduced solar access for the block. More specifically, the obstruction angle[5] for the first and second floors of the SE facade is greater than 45^0 (heavy obstruction), between 15^0 and 45^0 for the third, fourth and fifth (medium

[5] Obstruction angle is the average angle from the centre of the facade to the top of the obstruction. Obstruction is heavy when this angle is greater than 45^0, moderate when it is between 15^0 and 45^0, and it is considered negligible when smaller than 15^0 (LT Method -Energy Tool for Non-Domestic Buildings).

obstruction) and only for the last two or three floors it is less than 15^0. The street level receives direct sunlight only in June when the solar altitude is at its maximum (73^0) and the sun wanted the least (see figure). This means that the potential benefits of a favourable orientation are reduced significantly both for the buildings and for public space.

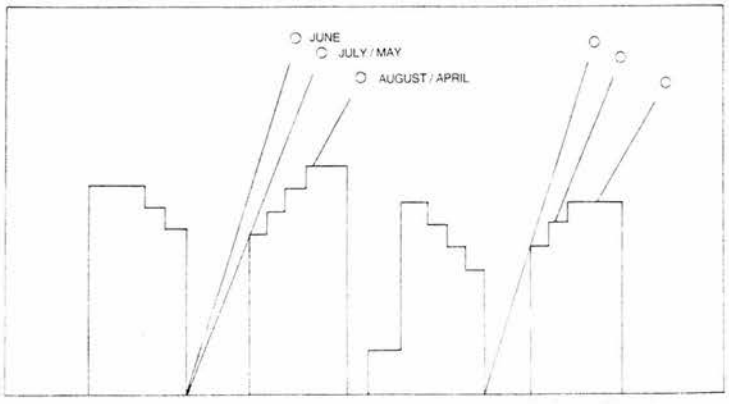

Figure 7.4. The solar access of the buildings and the street is heavily obstructed (section 1-1, scale 1:1000)

Therefore, it is not surprising that the treatment of the facades does not vary according to their orientation. The only observable variation on the glazing ratios (glazing area to total facade area) of the buildings of the block is that they tend to be higher on the street facade, regardless its orientation, rather than on that facing court. Primary uses are normally situated towards the street. Plan and facade design, therefore, are designed with respect to their relationship to public urban space, rather than with respect to their requirement for solar access. The squalid condition of the supposed courtyard in the middle of the block is probably another reason why glazing and primary uses in the facades overlooking it are reduced.

Calculated with the LT Method for Southern Europe, without accounting for obstruction, average energy requirements for heating and lighting of the six buildings that are built continuously are approximately 167KWh/m^2 per year. It is also interesting to note the following:

- Building 7, on the SW, which has the most favourable orientation and the highest exposure to solar radiation, because it is completely detached, has the lowest energy requirements (153KWh/m^2).
- The building with the highest energy requirements is the one with the smallest surface area exposed to solar radiation. It only receives lower angle East and West radiation, as it is attached to other buildings on the South and North. For the same

BLOCK OF INTENSE URBANISATION	Energy required for lighting $KWh/m^2/y$	Energy required for heating $KWh/m^2/y$	Energy required for cooling $KWh/m^2/y$	Total energy required $KWh/m^2/y$	CO_2 emissions $Kg/m^2/y$	Passivity %
Building 1	47.68	116.78	-	164.46	43.19	71
Building 2	54.60	117.45	-	172.05	44.89	59
Building 3	43.72	120.85	-	164.58	43.45	77
Building 4	45.39	117.68	-	163.07	42.9	74
Building 5	47.70	115.51	-	163.21	42.8	70
Building 6	48.3	118.14	-	166.4	43.63	69
Building 7	48.04	105.66	-	153.71	40.15	71
Buildings 1-6 (built continuously)	47.22	119.60	-	167.80	44.90	71

Table 7.1. Annual energy requirements, CO_2 emissions and passivity ratios of the block of intense urbanisation.

reason, it also has the lowest passivity ratio of the buildings of the configuration (59%).

- Calculated as one, the six continuous buildings require 10% more energy per square metre than the detached building on the SW. Being attached to one another, they have reduced exposure to the sun. They also have less favourable orientation. In addition, the buildings' SW elevations are either completely blind, or face the court with small windows of small secondary spaces. The fact that two SW elevations have no openings is indicative of an inflexible and repeated process of production. The buildings were built as if the 'court' would be complete with more buildings, even though the existence of the church made this impossible.
- Variations in energy requirements among the six continuous buildings are small and, given the almost repeated plan and facade design, depend mostly on the relative position of the building in the block. Corner buildings tend to have higher passivity ratios.
- Moreover, orientation, and hence, solar gains of constituent buildings, of this configuration are determined by the orientation of the site of the block, as designated by the street plan.
- On average, over 28% of the total energy requirements of this configuration are for lighting.

On the whole, it can be said that, the configuration reduces solar exposure of its constituent buildings as well as their potential for passive heating and lighting, as it invokes plans with low passivity ratios. Passivity ratios are also reduced by the big subdivision of plans in order to create more flats and rooms.

Buildings of the block of intense urbanisation are not air-conditioned. However, a calculation of the energy that would be required for cooling its buildings, i.e. a calculation of the block's 'cooling load', gives an indication of the probability of overheating during summer months. Calculated for the six continuous buildings of the block, the cooling load is approximately 91.25KWh/m^2 per year which means that the buildings' energy consumption would increase by approximately 55%. This also means that buildings are most likely to experience overheating.

When obstruction is taken into account, the energy requirements of the six attached buildings of the incomplete 'court' increase by over 13%, the biggest effect being on energy required for lighting, which increases by 26%. Overshadowing is caused not only by neighbouring configurations but also by the constituent buildings of the examined configuration itself.

The continuous building system evokes a compact form. It is well established, among passive solar strategies, that flats are economical in terms of heat losses, compared to all other forms of building (detached, semi-detached and terraced houses). The fact that solar gains are so drastically reduced both by reducing exposure and by overshadowing appears to be negating the benefits of the compactness of form.

The only tool for protecting solar access is the set-back of the upper floors from the front facade with a view to letting more light down to the lower storeys of the opposite buildings. Parts of the terraces created by that set-back are often illegally covered with glass and aluminium or steel structure to increase interior space. These illegal extensions appear invariably to elevations oriented to all directions and are not insulated or protected from the sun. In most cases, they are overheated in the summer and too cold and impossible to heat in the winter. None of the basic principles of passive solar design is employed and the potential energy advantages of such buffer spaces are cancelled.

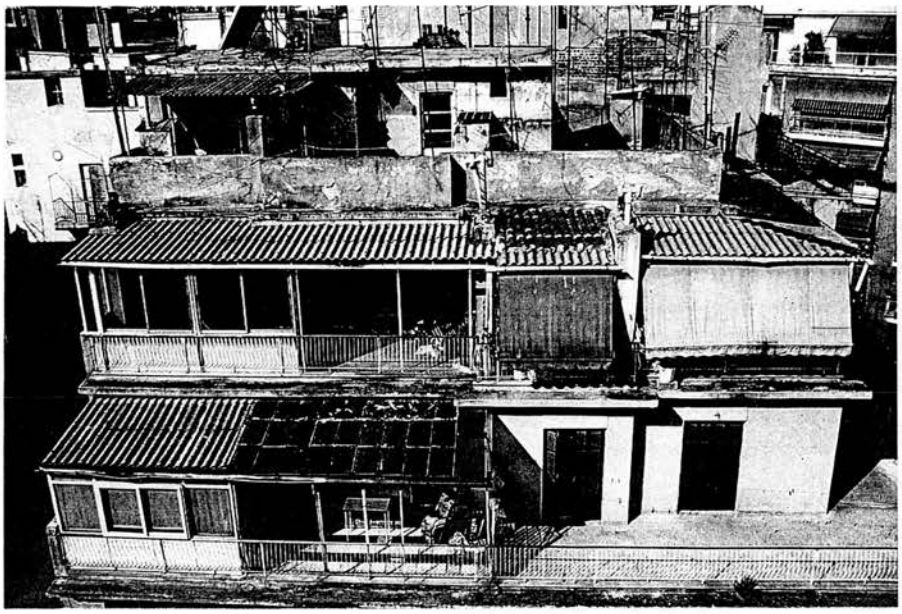

Figure 7.5. Parts of the terraces are covered illegally

There is a tradition of high density building in Greek and other Mediterranean cities as well as in vernacular settlements. High levels of obstruction that result from this are desirable, to an extent, as they offer protection from direct sunlight during the summer and thus reduce the danger of overheating and glare. Moreover, the 'court' configuration is found to receive the least solar radiation on its facades, compared to other generic urban forms, and hence to offer solar protection in hot climates (Steemers et al. 1996, p335). However, given the high levels of obstruction and the lack of any passive strategy in architectural design, most of the flats, particularly those in lower storeys are deprived from low altitude winter sun and, hence, from the potential to utilise natural light as well as passive and active solar strategies for heating and hot water. In addition, the irregularity of heights of this block's constituent buildings reduces the potential of employing active solar strategies on their roofs (e.g. photovoltaics etc.). Although Thessaloniki features a mild Mediterranean climate, absolute minimum temperatures fall below 0°C from December (-4.8°C) until March (-0.8°C). Therefore, there is a considerable scope for designing for passive solar heating and lighting, apart from designing for solar protection and natural cooling and ventilation. This would not necessarily mean reduction of densities of building but it would mean more sophistication in urban and architectural design.

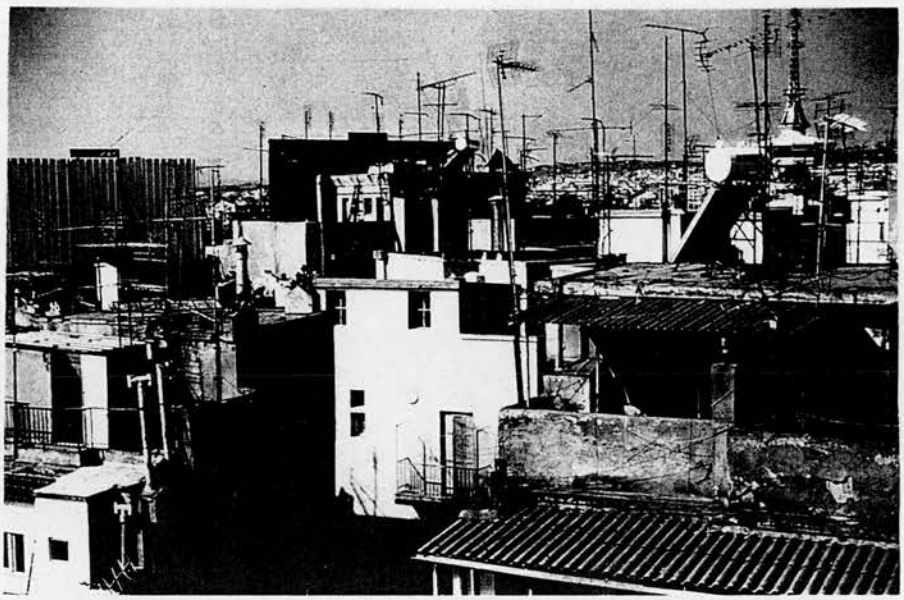

Figure 7.6. The heights of the constituent buildings are not uniform

Despite the heavy overshadowing by surrounding buildings, high altitude summer sun can reach most flats and can cause overheating and glare. Balconies offer some protection. As there is no overall strategy for solar protection, movable awnings are installed individually and vary in type and colour.

All buildings of the block of intense urbanisation were built with *in situ* concrete and brick masonry. There are no generally accepted values of the embodied energy of building materials. This is so because the production process of any building material varies considerably among different production plants. In addition, the parameters taken into account in the process of calculation have not, as yet, been finalised[6]. The above result in huge differences in the estimated embodied energy of the same material in different publications. Therefore, the values given for building materials of the examined configurations are indications, rather than accurate calculations.

Roughly speaking, manufacturing of concrete is not very energy intensive. It requires 275KWh/tonne, which is very low compared, for example, to steel which requires 13,200KWh/tonne (Halliday, 1994, p55). For building in Thessaloniki, concrete is

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6 For instance, it remains an open question whether energy required for transportation or for demolition of the material should be incorporated. See Lyle, Tillman John, *Regenerative Design for Sustainable Development*, John Wiley and Sons, New York, 1994, Vale, Robert, 'Selecting Materials for Construction', *European Directory of Sustainable and Energy Efficient Building*, 1995, Halliday, S.P., *Environmental Code of Practice for Buildings and their Services*, BSRIA, 1994, Howard, Nigel et al., *Embodied Energy and CO^2 Emissions for Building Materials*, BRE PD, 109/94, 1994.

prepared by 15 small production units situated within a radius of roughly 25km around the city. Therefore, energy required for transportation of concrete should be relatively low. Cement is also provided by nearby quarries.

Notwithstanding its low energy content, the environmental impact of the production of concrete on Thessaloniki's surrounding countryside is noteworthy. All quarries are obliged by law to quarry in grades of no more than 8 metres high. They are also obliged by European legislation, which has been transposed to Greek national law, to recover the landscape when quarrying is over. Nevertheless, quarrying is done in grades of 15 metres at best, or at random and without any precaution, at worse. As a result, quarry recovery becomes impossible, even in the rare cases when recovery projects are implemented.

Bricks require 860KWh/tonne and are also produced locally within a radius of 15km around the city. Timber, which is considered one of the most ecological building materials, has limited use in construction of apartment buildings, for door and window frames and, to a lesser extent, for floor finishes. As it is normally imported from several countries (Africa, Scandinavia and North America), it has 1,450KWh/tonne embodied energy that is high compared to 200KWh/tonne, estimated for local airdried timber (Halliday, 1994, p55). Use of Greek timber, however, is very limited and mostly for construction purposes.

All apartment buildings of this configuration were built before the introduction of the Thermal Insulation Code in Greece in 1979, which means they are not insulated. The mean U-value of the walls of the buildings of this urban from is calculated to be approximately 3.2W/m^{2}K[7], of the concrete flat roofs to approximately 1.4W/m^{2}K, and of the floors on the ground to approximately 2.6W/m^{2}K. The openings have single glazing. This means that heat losses both through the fabric and the openings are increased, if compared with buildings built after 1979. Lack of insulation is particularly evident at the top floor flats that suffer from cold in the winter and overheating in the summer.

Heating is provided by oil or electricity individually for each flat. The density of residences in the block would make it economical to install central heating facilities to

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[7] This calculation includes plastered brick masonry and reinforced concrete structure, and single-glazed openings with timber frames. The mean glazing ratio (glazed area to total area of external walls) is 20%.

provide for the whole block. This opportunity apparently has not been explored. Natural gas has not yet been introduced and the buildings in question will have to be retrofitted to use it when it becomes available (see Chapter 5). The block is not air-conditioned. Individual air-conditioning units have recently been installed in some of the ground floor shops and workshops and a few flats.

Using the LT Method for South Europe, again, the annual CO_2 emissions of the six continuous buildings are calculated to be approximately 45Kg/m^2.

In terms of architectural quality, the block's constituent apartment buildings present a marked homogeneity characterised by a consistently low quality of design. They exemplify the prevailing local interpretation of Modernism which fostered the movement's standardised, mass-produced and placeless aesthetics while discounting on its requirements for rational function and 'air, sun and green'. In the case of Greek urban architecture, this aesthetics did not correspond to actual mass-production of building components or optimised modular spaces, but to a fast and repeated process of design and construction spawned by urgent need for housing and the respective opportunity for speculation. The latter is dramatically materialised in the way early 20th Century Armenian Church is virtually hidden by the block, one of its spires, actually, touched by one of the buildings (see cover page of this chapter).

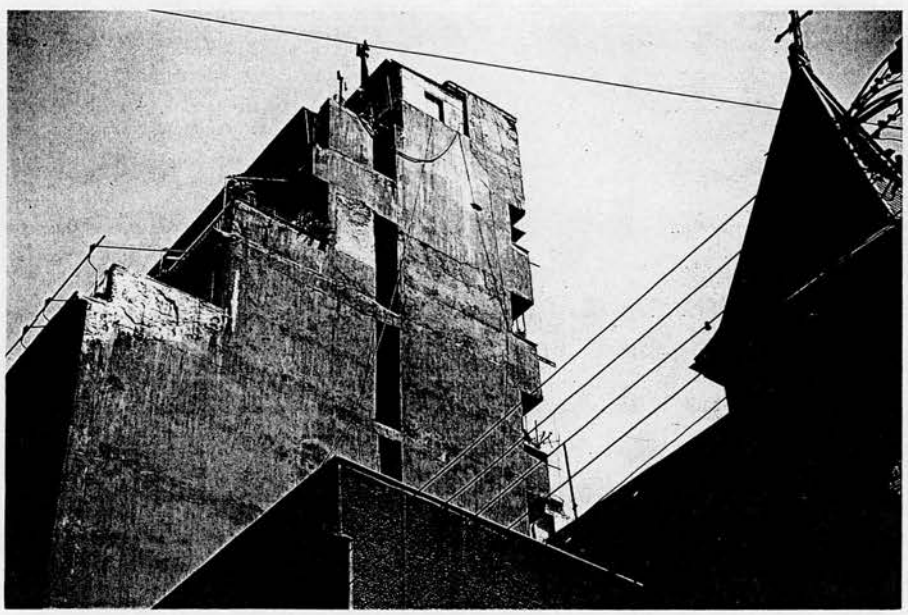

Figure 7.7. The block's relation with the historic building

Notwithstanding stylistic homogeneity, the constituent buildings do not create either a block with uniform height or a unified usable space in the middle of the incomplete

court. The space in the middle of the block consists of inaccessible residual spaces, at different levels resulting from unauthorised extensions of the buildings. Access to the biggest of these spaces, which is actually the roof of an unauthorised garage, is limited to one first floor flat. Most of the rest of the spaces are not accessible and have ended up functioning as refuse deposits.

Residential density in this part of the centre of the city is over 500 people per hectare. This is very high compared to central densities of other European cities like Paris with 235 people/hectare, Amsterdam with 108 people/hectare, let alone North American and Australian city centres (Los Angeles 29p/h and Melbourne 25 p/h) (Newman and Kenworthy, 1989, p42).

The mixture of uses occupying the buildings of this form is high. Ground floors are invariably occupied by retail and service shops for the neighbourhood and the entrances to the apartment blocks. The rest of the storeys are purely residential. Although the form examined is on the edge of what could be termed the CBD of Thessaloniki, it exhibits a wide range of typical neighbourhood uses mixed with residences. In effect, this is true for the whole of the central core of the city which features residential and recreational uses in combination with business and commercial ones.

Within the discourse of urban sustainability, this feature, of intensified central core with mixed uses and high densities, has been established as positive as opposed to segregated uses and low densities. In North America, planning directions encouraging mixed uses and residences in the city centre are currently being promoted as a crucial step towards sustainable urban development. Jane Jacobs (1962) in her influential book *The Death and Life of Great American Cities* advocated mixed uses as a way to promote diversity and safety on the streets.

In the case of central Thessaloniki, mixture of uses has not been the result of conscious urban planning but rather of the absence of it. Modern ideals of functional zoning have never been implemented in Greece. In retrospect this has some positive aspects, i.e. dormitory suburbs and declining CBDs are not a common feature of urban Greece.

However, high density of development in the block of intense urbanisation affects the residences solar access, communal and green space, historic image, views and quality

of life, in general. Incrementally and in interaction with public urban space, high densities affect the city's potential for traffic management, open space, improvement of atmospheric quality and historic identity.

In the A' Municipal Department of Thessaloniki, 31.5% of residents rent and 68.5% own their residences. This high percentage of owner-occupiers is slightly lower than that of other areas in the city, which developed later, as well as to the city's average (70.3%) (Velentzas et al., 1996, p185)[8]. This is attributable to the recent trend of Thessaloniki's middle-class population to move to the outer rings of the city and let their central flats to younger, poorer or more transient people. Flats in this area are close to Aristotle University campus and are often rented by students. The shift to the suburbs is not unrelated to the environmental condition of the central core of Thessaloniki and its fabric.

7.2.2. Process

All apartment blocks of the block of intense urbanisation have been built according to the General Building Code (GBC) valid from 1955 until 1973, when it was again modified. The buildings were allowed to cover 70% of each plot. The minimum buildable plot was 200m² with at least 10m facing the street. In actual fact, just under 90% of the whole site of the block is built up. The remaining 10%, as mentioned earlier, is subdivided, largely inaccessible and, hence not usable.

Planning regulations for the area examined specified the so-called 'mixed' system of building. This system required that buildings were attached to each other in pairs leaving a minimum distance of 2.50m between them and neighbouring pairs of buildings. However, this system has not been realised and the block has been built continuously.

The plot ratio permissible when the buildings of the block were built was 4.8. Since 1993, with the General Urban Development Plan (GUDP) of Thessaloniki, the plot ratio in the area has been reduced to 2.4 but no building has been built since, as there was no plot left unoccupied. The implemented plot ratio is nearly 6 which means that

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[8] Greece has the third highest ratio of owner-occupied housing in Europe (77%). Owner occupation has been rising in Europe in the last 20 years. It is interesting to note that the highest ratios of owner-occupied housing are found among the poorest countries in the European Union in terms of GDP per capita: Ireland is first with 81% of its stock being owner-occupied, Spain is second with 78% and Greece, with lowest GDP per capita in the EU is third with 77% of its housing stock being owner-occupied (Oxley and Smith, 1996, p74).

more than 3,000m^2 were built illegally in excess of the permissible built space at the expense of the quality of space provided and, considered incrementally, the quality of urban space. Apart from exceeding permissible land coverage, unauthorised building has also exceeded permissible height, adding one or two more storeys set-back from the street facade. This indicates lax regulation and control. In the period when the block was built it was not uncommon for developers to start building having only permission to excavate. Besides, it was the same period that saw the peak of unauthorised housing construction on areas outside the approved urban plan to the West Thessaloniki.

Looking at the socio-economic circumstances and the economic mechanism that spawned the production of this configuration offers an insight to the origins of its unsustainability. Between 1961 and 1971, the population of Thessaloniki increased by 47%, from 380,654 to 557,360 people. The city's annual growth rate, 3.89%, during that decade was, for the first time, greater than that of Athens (3.21%) (Leontidou, 1990, p104). Consequently, more than one fourth of the total building stock existing in Thessaloniki in 1990 was built between 1961 and 1971 (NSSG, 1995, p321).

While there was country to city migration immediately after Word War II, this was not for economic reasons but rather for political: cities were a safer place to be during the civil war that followed WW II and lasted until 1949. Over 30% of Greece's building stock was destroyed during WW II and the civil war, and massive reconstruction was required to deal with acute housing shortages[9]. In the two decades that followed, Greece experienced unprecedented economic growth and raised its GDP from $180 in 1955 to $1060 in 1970 (Leontidou, 1990, p93). This 'economic miracle', similar to equivalent developments in other South European countries, was partly due to industrialisation, particularly in the areas surrounding Athens and Thessaloniki, and partly due to tourism and construction. Industrial development and the growing service sector may have attracted rural populations in the city, but housing construction, towards which most private investment was directed, created more employment, boosted construction related industry and housed incoming populations.

As mentioned in the previous chapter, construction of housing has, to an extent, created the 'economic miracle'. The thrust housing construction offered to the

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[9] From Ellis, H. *Industrial Capital in the Development of the Greek Economy*, KEPE, Athens, 1965, p214 (in Greek) (quoted in Velentzas et al., 1996, p50).

country's economy may explain partly the state's tolerance towards exceeded development rights and breached building regulations and towards whole unauthorised settlements in the urban periphery. It may also explain partly the excessive permissible rates of exploitation of urban land. In an inflational mode, higher plot ratios and maximum heights were allowed[10], while at the urban planning level the boundaries of the city were constantly extended, thus, transforming previously agricultural land to much higher value urban plots with excessive development rights.

Another explanation of official tolerance to unauthorised settlements and increasing permissible plot ratios is the complete absence of housing policy in Greece. All buildings in the block of intense urbanisation have been built privately and are privately owned. This is true for the vast majority of the building stock the country. Public investment in building construction has been insignificant, and even more so in the housing sector[11]. The latter differentiates production of housing in Greece from almost all other European countries. In the former, provision of housing was left almost entirely to the market, while in the latter it was considered as an essential component of a state social policy. Moreover, the rare cases of publicly funded housing in Greece, mostly built to house refugees from Asia Minor following the exchange of populations in 1922, where aimed for private ownership. Rented social housing, quite a common policy in other European countries[12], is non-existent in Greece.

As a corollary, the rural populations that were inundating Athens and Thessaloniki in the 1950s and 1960s were presented with the following two market-led options to be housed. First, they could build their own single-family house illegally, on legally purchased agricultural land on the immediate periphery of the approved urban plan. Unauthorised settlements developed rapidly in the period of intense urbanisation, usually occupying the most disadvantaged and inaccessible areas of the urban periphery, in the proximity of industrial areas. The second option of housing was in apartment buildings built legally within the approved urban plan through the

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[10] The last, and most substantial, increase of permissible plot ratio was made in 1968 during the dictatorship (1967-74) with Law 395. This law was cancelled in 1979 and a maximum ratio of 2.4 was set for all future development (Velentzas et al., 1996, 106).

[11] In the post-war years public investment in housing as a percentage of total annual investment in housing has been constantly decreasing and since 1972 it has constantly been below 2% (Leontidou, 1990, p139).

[12] Rented social housing is a common housing policy particularly in the Netherlands where 40% of the housing stock is social rented, Sweden (36%), the UK (26%) and Denmark (24%) (Oxley and Smith, 1996, p74).

mechanism of *antiparochi*. All buildings of the block of intense urbanisation were built by private developers through this 'Greek capitalist invention' (Hastaoglou et al., 1987, p163) that led to the expansion of the building industry after the World War II and has been often blamed for the image of the modern Greek city.

Antiparochi is a deal between the developer, who is often also the contractor, and the landowner. The developer is given the right to develop the plot by the landowner, in exchange of a percentage of the finished product, i.e. the building[13]. This exchange is profitable for the developer, who acquires land for development without investing any capital, and convenient of the landowner who acquires housing also without paying and without losing his/her land entirely (Velentzas et al., 1996, pp117-118). The percentage of the building remaining with the landowner is 30-70%, depending on the attractiveness of the plot, the quality of construction etc. Exploitation was common. It was only natural that *antiparochi* has spawned low constructional quality of most apartment blocks; cutting corners in construction was an obvious way to increase margins of profit for the developer. This was not to the benefit either of the landowner or to the rest of building's tenants. It was not to the benefit of the image of the city as a whole.

The development and massive application of the mechanism of *antiparochi* was assisted by the big subdivision of land in Greek cities, on one hand, and a regulatory framework which allowed high exploitation of land and low constructional standards, on the other. The same factors facilitated the development of small, and often purpose-built, constructional companies with limited initial capital - they could finance building by selling flats before they were built - and limited expertise. The design of most of the apartment blocks were not carried out by architects. During the period of intense urbanisation, the involvement of building experts in the building process was limited and repeated construction of a basic scheme, marginally complying with the current building and planning regulations was the norm.

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[13] The legislative framework that made antiparochi possible was, on one hand, Law 3741/1929 'On horizontal ownership' which facilitated ownership of shares of subdivided plots that do not correspond to specific portions of the land, and on the other, the high exploitation ratios permitted by Greek planning policy (Velentzas et al., 1996, pp115-116).

7.3. The Cluster of Diffuse Urbanisation

The second urban configuration is a group of ten (10) apartment buildings which form a cluster of 'building units' organised around an open space. It is situated in the eastern part of the Municipality of Thessaloniki, in its Fifth (E') Municipal Department which was only sparingly built until the 1970s (see figure 7.1). The particular site started to be developed in mid-1970s, continued in the 1980s and was complete only in 1997. While the block of intense urbanisation was complete, or rather overdeveloped, within 8 years, the one in this section had a much slower development process which lasted over 12 years.

7.3.1. Form

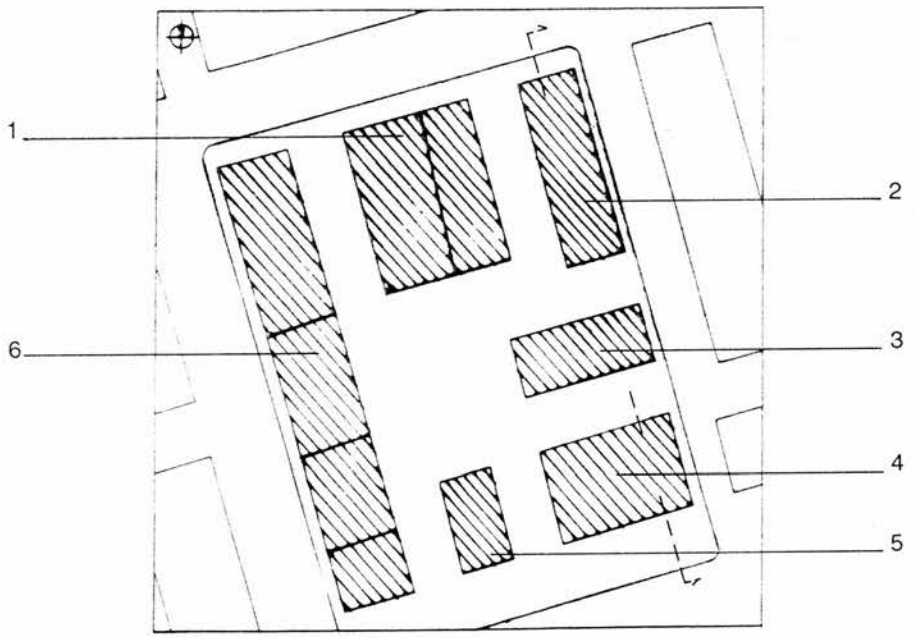

Figure 7.8. The cluster of diffuse urbanisation, scale 1:1000

The long axis of this configuration is slightly deviated from the North-South axis. Half of the 'building units' that constitute this form are oriented in the same way and the rest are on the East-West axis. Apparently, this arrangement does not emanate from any consideration of the orientation of the units or their urban image. It is more likely that it stemmed out of the arduous task of allocating equitably the development rights among the different small plot owners while controlling the combined effect of their individual materialisation towards a preconceived urban configuration.

The constituent buildings of this urban configuration are 6 to 8 storeys high. The streets surrounding it are 22, 13, 14 and 9 metres wide, the widest being to the South.

Obstruction from surrounding buildings is heavy to the East and medium to the West and North. There is, also, heavy obstruction by the 'building units' of the configuration themselves, as they are situated 8 metres away from one another. In the same way with the block of intense urbanisation, there is no account of the buildings' orientation in the treatment of the facades or plans. Glazing ratios are noticeably higher on street facades rather than on those towards the central open space or the pathways that lead to it, regardless the orientation. In general, glazing ratios in this configuration are higher than in the previous one. These buildings on average also enjoy higher passivity (75%).

Figure 7.9. Obstruction from surrounding buildings is heavy

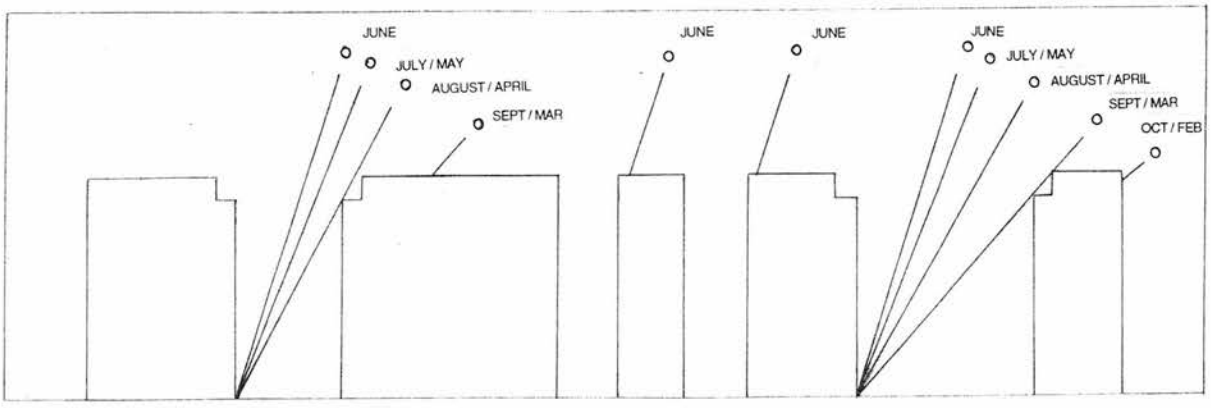

Figure 7.10. The solar access of the buildings and the common space in between is heavily obstructed (section 1-1, scale 1:1000)

CLUSTER OF DIFFUSE URBANISATION	Energy required for lighting KWh/m²/y	Energy required for heating KWh/m²/y	Energy required for cooling KWh/m²/y	Total energy required KWh/m²/y	CO_2 emissions Kg/m²/y	Passivity %
Building unit 1	49	111.82	-	160.9	42.1	66.5
Building unit 2	44.21	112.9	-	157.16	41.3	77
Building unit 3	32.9	112.65	-	145.55	38.78	96
Building unit 4	43.13	104.3	-	147.43	38.69	77
Building unit 5	36.36	100.17	-	136.53	36.05	89.5
Building unit 6	46.14	114.95	-	161.09	42.33	73
Weighted average Building Units 1-6	44.51	111.8	-	156.30	41.09	75

Table 7.2. Annual energy requirements, CO_2 emissions and passivity ratios of the cluster of diffuse urbanisation

The average annual energy requirements of the 'building units' of this configuration, calculated with the same method, is reduced compared to the previous one. On average, these buildings require approximately 156.30KWh/m² per year which compared to the six continuous building for the block of intense urbanisation is reduced by over 6%. This can be attributed to higher exposure to solar radiation as well as higher passivity ratios. The latter, however, are also increased because flats as well as rooms tend to be bigger in this configuration. Other observations regarding how this configuration affects the energy requirements of its constituent buildings are the following:

- Variations among energy requirements of individual 'building units' in this configuration are greater than among constituent buildings of the block of intense urbanisation, as they vary more in size, orientation, exposure to radiation and passivity ratios.
- 'Building units' consisting of one building only, have the highest exposure to solar radiation, highest passivity ratio and hence lowest energy requirements.
- In contrast to the block of the previous section, the orientation of individual buildings and units in this configuration is not determined by the orientation of the site of the cluster as designated by the street plan, but by their relative position in it, as designated by the area's planning regulations.

- Approximately 28% of the cluster's energy requirements is for lighting. This percentage is reduced to 22% for the building with the narrowest plan (Building 3), that is situated on the East-West axis.

On average it can be said that, this configuration invokes bigger exposure to solar radiation and higher passivity ratios than the previous one. It also has a strong effect on its constituent buildings' energy requirements as it determines their plans' depth, their size, solar exposure and orientation. This effect, however, has not been directed towards increasing potential for passive heating and lighting. It has been the haphazard outcome of allocating development rights.

If obstruction of solar access, by surrounding buildings as well as by the 'building units' of the configuration themselves, is taken into account, the average annual energy requirements of the cluster increase by 9.5% (171KWh/m^2). Again, the effect of obstruction is more remarkable on energy required for lighting which increases by almost 27%.

The open space in the middle of the configuration is paved and uniform, unlike the one of the previous configuration. It is surrounded by buildings on average 27 metres high, which means its solar exposure is obstructed from October till January (see figure 7.10). The main use of this space is illegal parking. A zone of 2.5 metres at the back of each building unit is fenced by metal railings and is accessible only to key holders. This is done to protect the parking space enclosed which is particularly precious in the congested city of Thessaloniki. Decorative planting aims at upgrading this space which is connected to all surrounding streets through paved paths and therefore is accessible both to the inhabitants of the configuration and to passers-by. The open-air weekly market of the neighbourhood overspills in this space.

Some of the buildings were built after 1979 and, therefore, are insulated according to the requirements of the Thermal Insulation Code. This divides the country into three climatic zones according to the mean minimum temperature and to the heating period of each location [14]. Thessaloniki is situated in climatic zone C which is the coldest in the country and for which the highest insulation standards are required.

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[14] The temperature, according to which the designation of climatic zones is made, is the mean minimum that occurs once a year for more than two consecutive days. This varies from 5° C in South Crete to -12° C in the region of Epiros, North Greece. The heating period varies from 60 days in South Crete to 210 days in North Greece and is calculated according to the number of days with me an temperature lower than 10° C (Thermal Insulation Code, 1979).

For this climatic zone the Insulation Code requires that:

- external walls and party walls separating heated from non-heated spaces should have U< 0.7 W/m^2 K,
- horizontal surfaces that separate an internal heated space from the outdoor (roofs or floors over pilotis) should have U< 0.5 W/m^2 K, and
- floors on the ground or above non heated spaces should have U< 0.7 W/m^2 K.

All buildings in this configuration have oil-burning central heating for the whole building. The ones that were built after 1985 have provisions for natural gas. The buildings are not air-conditioned. Several flats, however, have installed individual air-conditioning units, which are fixed externally.

The average annual CO_2 emissions of this urban configuration, without accounting for air-conditioning, are approximately 42 kg/m^2.

In terms of embodied energy, the cluster of diffuse urbanisation is roughly the same as the previous one. Buildings are also built with *in situ* concrete and brick masonry. Window frames are aluminium which has been estimated to have 27,000 KWh/tonne embodied energy, which is much higher than that of the timber frames of the previous configuration. Insulation also increases the buildings' energy content (estimated embodied energy 1,125 KWh/m^2, Halliday, 1994, p55).

Although stylistically following the same tradition, there is some improvement in terms of construction quality. The basic scheme is still repeated with no concerns about architectural quality, but there is some degree of variation and sophistication in external finishes, claddings and railings. In this case, there are no illegal enclosed terraces, added floors above permitted heights, or unauthorised extensions on the open space. All first floors are at the same level. The last floor of each building is set-back by the standard depth of 2.5 metres and is 3.20 metres high. This uniformity of volumes and heights along with the unified and accessible open space of the configuration are seen as elements of 'good manners' in urban architecture. They indicate collaboration between the form's constituent parts with a view to controlling its urban image and function.

The pattern of land use and residential density in this configuration is almost the same with the previous one. Shops occupy the ground floors and the rest are purely residential. Some mezzanines are occupied by offices. The ground floor shops on the

street to the North are typical neighbourhood services while the ones on the wider and tree-lined street to the South are mostly cafes, restaurants and take-aways.

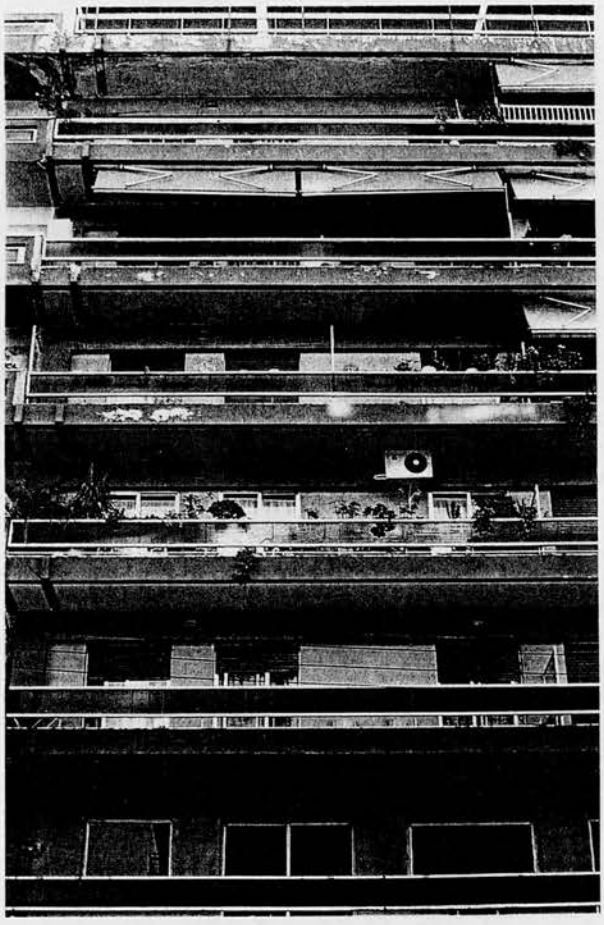

Figure 7.11. Stylistically, the buildings of the cluster of diffuse urbanisation follow the Modernist tradition.

The percentage of owner occupied flats in this area is slightly higher than in the A' Municipal Department. 71% of the residents are owner-occupiers (Velentzas et al., 1996, p185). This area tends to be inhabited by higher income people and also the 'objective value' of the properties as defined by the state is higher. On average, flats in this area are bigger than in the previous (Velentzas et al., 1996, p154).

7.3.2. Process

The cluster of diffuse urbanisation developed, in exception of the General Building Code valid between 1973 and 1985, and according to a decree produced by the dictatorship in 1970. This decree modified the street plan and building regulations for this area only and can be seen as an attempt to control urban space in a period when urbanisation was continuing, but was also directed towards other, smaller urban

centres in the region. The system of designating 'building units' rather than blocks had been earlier implemented in the plots on the city's New Sea-front (Nea Paralia)[15].

The building system in this area, as defined by the 1970 decree, is different than in the one examined in the previous section. Apartment buildings are either free-standing or attached to one another to form 'building units' which are arranged around an open space. The decree does not define either maximum permissible plot ratio or maximum permissible land coverage. The area on which building is permitted is accurately defined with a view to creating a meaningful open space between the 'building units'. The land coverage within the designated areas is 100%. The maximum number of storeys allowed is 8 and the maximum permissible height of each unit is determined with reference to the level of the sea. The floor level of the first story of each 'building unit' is also determined by the decree (figure 7.12.).

In a similar vein to the regulations that have shaped the urban form of the last section, the last storey of each building is set back from the facade. In this case, regulations are more accurate, defining the exact depth of the set-back and the height of the last floor.

Both open space and urban image are valued in the planning regulations controlling this form more than they were in the built-up court of the previous section. The decree required that applications for planning permission for individual apartment buildings comprise drawings of the facades of all buildings already existing in the configuration with a view to inducing some uniformity of volume and architectural style.

All of the buildings creating this form were built privately with the system of *antiparochi*. In this case, the developer was normally a bigger firm and all experts of the building process have been appropriately involved.

When this configuration started to develop the rates of urbanisation of Thessaloniki were still high. The population of the city between 1971 and 1981 increased by 26%. This is, however, a reduced rate of increase compared to that of the previous decade and indicates the beginning of a period of 'relative centralisation' , i.e. population of the 'primate centre' increases while smaller urban centres begin to expand (Hall, 1984,

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15 Kalogirou parallels the Greek system of 'building units' to urban projects by early modernists like that of the extension of Amsterdam by Berlage between 1913-34 and that of New Frankfurt by Ernst May between 1925-30 (Kalogirou, undated, p50).

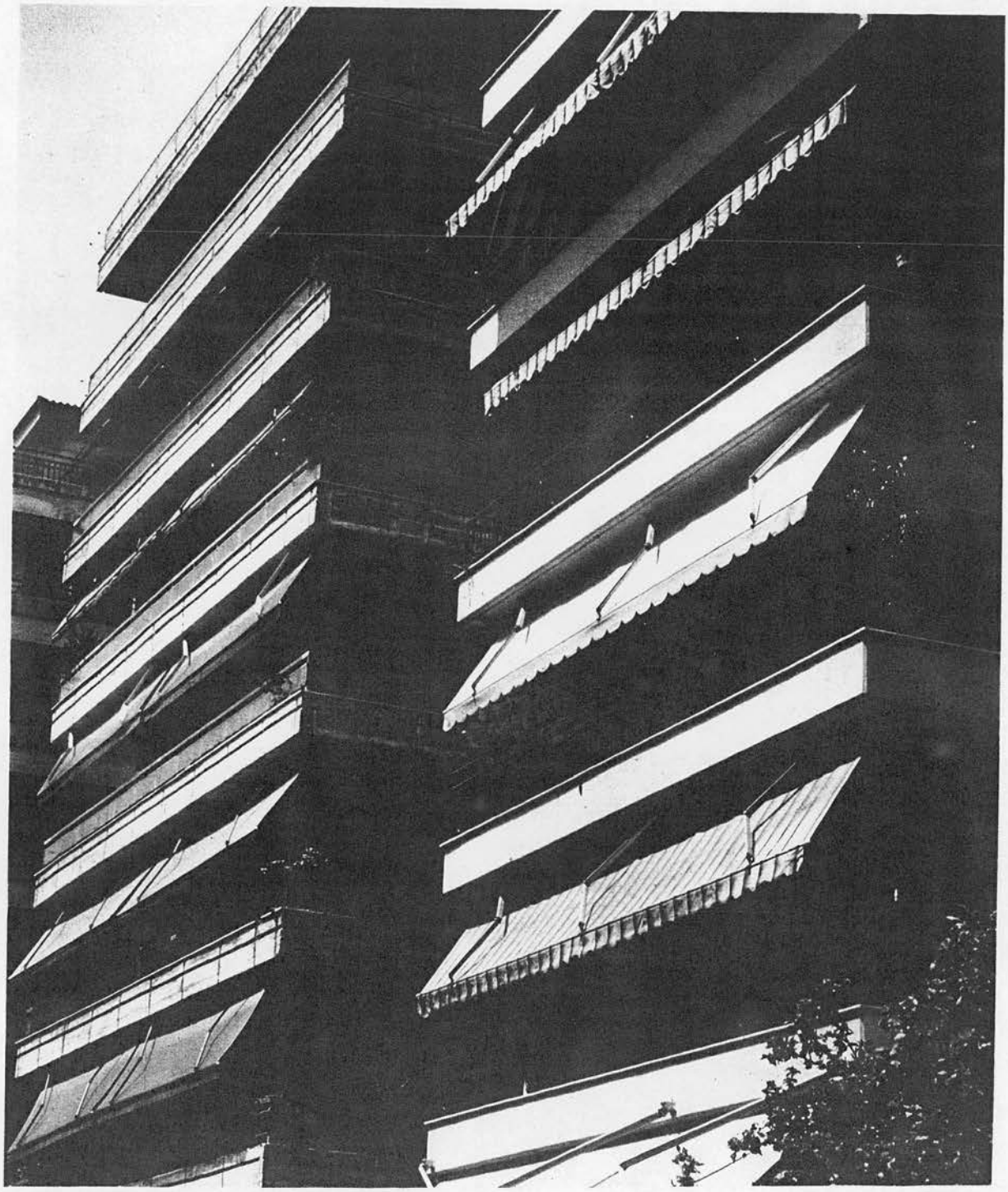

Figure 7.12. 'Building units' in the 'cluster of diffuse urbanisation

pp246-250, see Chapter 4 of this thesis). Smaller urban centres on the so-called 'S-shape development corridor' of Greece increased their population, after years of decline[16]. This emerging change in the pattern of urbanisation was even more observable in Athens, which reduced its annual rate of growth considerably from 3.21% in the 1960s to 1.77% in the 1970s (Leontidou, 1990, p104). The primacy of Athens has been steadily decreasing until the last population census in 1991[17].

Slower rates of urbanisation of the big urban centres were indicative of an emerging process of economic restructuring in the whole country, and the world. Deindustrialisation and the International Division of Labour, of course, were not felt in Greece with the intensity they were felt in Western European industrial cities. Industry, as already mentioned, has not been the main driving force of urbanisation in Greece. However, it should be noted that industrial employment in Thessaloniki, after two decades of steady increase started to stabilise in the mid-1970s while the service sector started to expand (Leontidou, 1990, p192). Rates of economic growth were also reduced.

Naturally, building activity was also less intense than it was in the 1960s. A slight decrease occurred between 1971 and 1981 which became more conspicuous between 1981 and 1991 (NSSG, 1995, p321). The year 1979, when the Thermal Insulation Code and other technical requirements were introduced and permissible plot ratios were frozen to 2.4, is considered a turning point for the country's, in general, and Thessaloniki's, in particular, building activity. In fact, Velentzas et al. (1996) identify in that year the beginning of an enduring crisis of the housing market of Thessaloniki which still remains officially unrecorded and, thus, unresolved.

In conclusion, it can be said that, the cluster of diffuse urbanisation presents similar values in terms of passive design, slightly increased energy intensity of construction and better services (central heating) compared to its predecessor. Densities of development are still very high, causing heavy obstruction of solar access. There is, however, improvement in the way urban space is treated both in the way buildings are

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16 The 'S' comprises the biggest urban centres of the country. It starts at the North East at the city of Kavala and reaches Patras at the South West through Thessaloniki, Veria, Larissa, Volos, Lamia, Halkida, Athens/Piraeus and Korinthos (see map of Greece in Chapter 5, p127), (Loukakis, 1977, Gerardi, 1979, quoted in Hastaoglou et al., 1987, p160).

17 Primacy is measured by the ratio of the population of the second city of a country, in this case Thessaloniki, to the population of the capital, in this case Athens. This ratio has increased from 20.5% in 1961 to 23.24% and finally to 24.37% in 1991, i.e. primacy has declined (Leontidou, 1990, pp105-107).

situated with respect to open space and in the way their volumes develop with respect to adjacent buildings. This is attributable to considerably less breaching of building regulations and exceeding of permissible exploitation ratios. In turn, this can be an outcome of the accurate character of the decree and of slightly reduced pressure for housing in the city. Although the well established pattern of developing privately and individually small urban plots is maintained some consideration of the buildings' combined visual and functional effect is shown. Form was modified in response to modified economic and social situation on one hand and regulatory framework on the other.

7.4. The 'Block' of Economic Restructuring

This configuration is also situated in the Fifth (E') Municipal Department of the Municipality of Thessaloniki. It consists of four (4) buildings, built between 1985 and 1994.

7.4.1. Form

The examined 'block' of economic restructuring has its long axis slightly deviated from the North-South axis. It is built compactly on the North and East side of the site and open towards the South. The buildings in this configuration are between two to seven storeys high. Three of them are attached to one another (continuous building system) and one is detached.

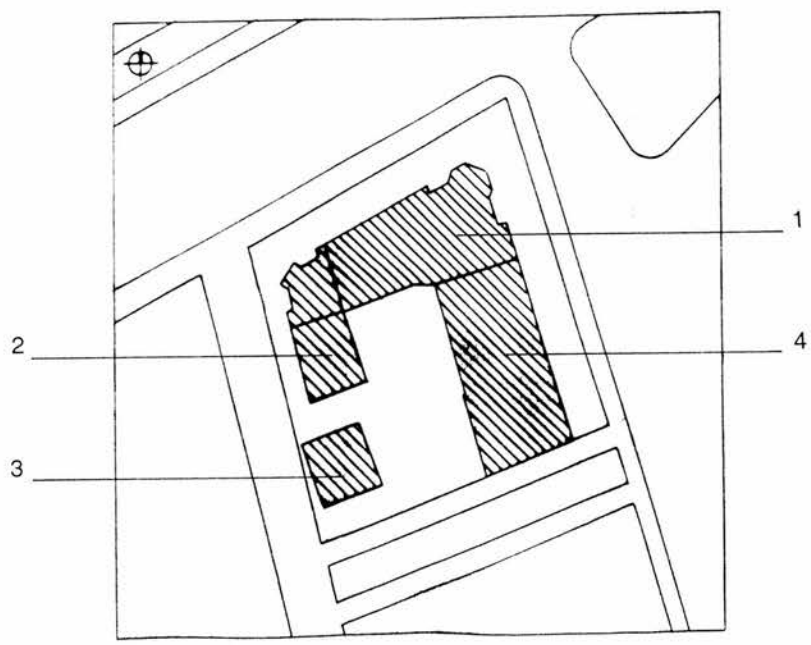

Figure 7.13. The 'block' of economic restructuring, scale 1:1000.

The streets surrounding the configuration are 36, 13, 10 and 16 metres wide with the wider being to the South. Streets are wider compared to the previous two configurations. This, combined with lower heights of adjacent buildings and a small park to the West of the examined configuration, results in low or no overshadowing from surrounding buildings. Three of this configuration's buildings are residences and one is an office building.

BLOCK OF ECONOMIC RESTRUCTURING	Energy required for lighting KWh/m²/y	Energy required for heating KWh/m²/y	Energy required for cooling KWh/m²/y	Total energy required KWh/m²/y	CO_2 emissions Kg/m²/y	Passivity %
Building 1	63.22	48.31	99.97	211.51	49.43	72
Building 2	-	-	-	-	-	-
Building 3	48.97	118.262	-	167.24	43.88	76
Building 4	49.44	115.47	-	171.26	44.61	68
Weighted average Buildings 1-4	57.80	73.97	-	193.50	45.80	70.8

Table 7.3. Annual energy requirements, CO_2 emissions and passivity ratios of the 'block of economic restructuring.

The annual average energy requirements per square metre for lighting, heating and cooling this configuration is approximately 193.50 KWh/m². More specifically:

- The office building is an 'exclusive' (Hawkes, 1982) air-conditioned building which requires annually approximately 211 KWh/m² just under half of which is needed for cooling. Its big South elevation does not have any glazing, while its equivalent elevation to the North is over 37% glazed.
- This configuration does not determine its constituent buildings' orientation, depth of plan or solar exposure. Hence, it has, potentially, the least effect on their energy requirements.
- The orientation of the buildings combined with the lack of obstruction and the irregular development of the volumes of this configuration result in high exposure to solar radiation.
- Passivity ratios are slightly greater in this configuration because there is smaller subdivision of plans to create bigger flats and rooms.

All buildings were built after the introduction of the Thermal Insulation Code and, therefore, are all insulated to the standards required for the climatic zone of Thessaloniki, as mentioned in the previous section.

The average embodied energy in this configuration is considerably raised mostly because of the extensive glazed areas of the office building. The manufacturing of glass requires 9,500KWh/tonne (Halliday, 1994, p55). Thermal insulation also increases the buildings' energy content. In addition, the office building is clad with marble which being local and natural requires low energy for manufacturing and transport.

There is much more variety in terms of architectural expression in this configuration than in the previous two. The office building obviously abandons the morphological vocabulary of modernism and subscribes to the latest international language for office building, that of commercial postmodernism. This is done by incorporating quotations from the history of architecture, like the dome on the urban corner, in a direct and unprocessed manner. The back facade of the office building, that sticks out three floors higher than the buildings adjacent to it, has no windows. Behind it there is a typical three-storey apartment building and two small self-built residences one of which has a pitched roof and a general allusion to vernacular architecture. There is no recognisable unifying agent in this configuration, either stylistically or in terms of volume. It is rather an aggregate of individual buildings than an urban configuration. The open space at the back is also residual and unusable.

7.4.2. Process

All buildings of this configuration were built according to the latest General Building Code, valid since 1985. This new Code gives restrictions about plot ratio and land coverage and relates the building's height to the plot ratio only, homogeneously for the whole country. The building can be positioned on the plot freely as long as it keeps a minimum distance from the boundaries of adjacent plots or it is attached to them[18]. It can be setback or tilted with respect to the street. The new Code has been welcome as increasing room for architectural creativity. It is true that, it imposes much fewer constraints to the way the building's volume is developed and sited than previous Codes. This freedom can be seen as a chance for higher quality of design and more

[18] The minimum distance Δ is a function of the height of the building, $\Delta = 3+0.10H$ (H is the building's height).

variety in the characterless homogeneity of the fabric of Thessaloniki and most Greek cities. It also increases the potential for employing passive solar design strategies.

At the same time, though, the new Code treats the building as a finished object on its own right and not as an incremental part of the urban fabric. It does not direct the development of individual buildings towards any preconceived urban configuration, like the ones previously examined. It simply tries to protect public space and private properties by defining development rights. In the 12 years that the revised GBC has been in force, the outcome of its anti-urban nature has materialised in Thessaloniki in areas with an unprecedented variety of architectural forms contributing to haphazard urban configurations and a fragmented urban image, on the whole.

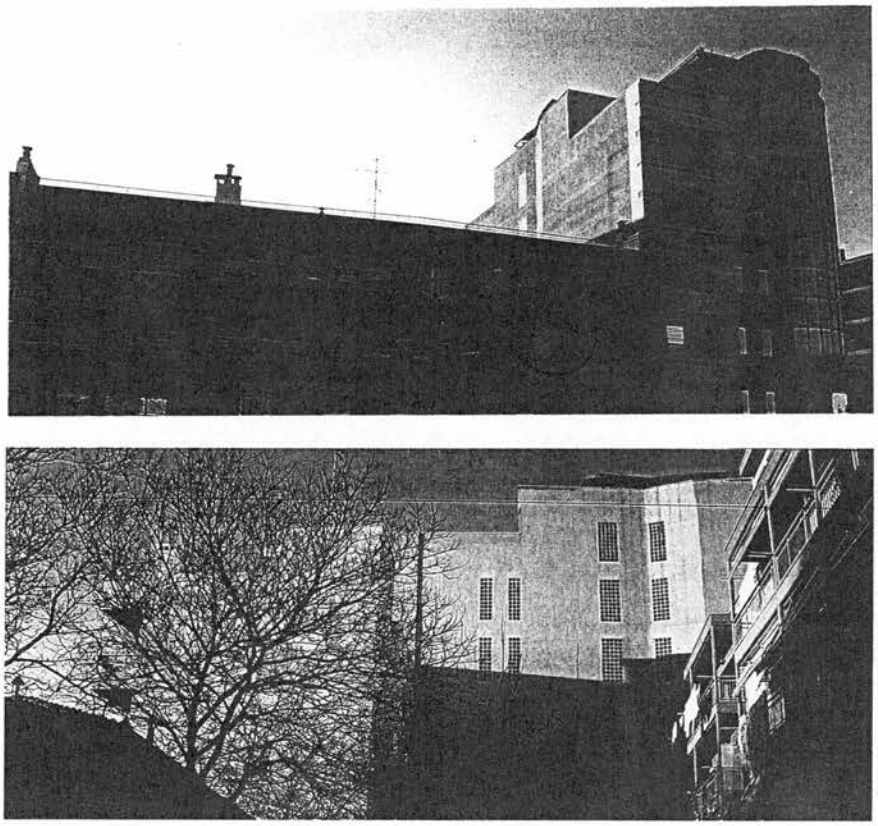

Figure 7.14. The buildings do not form a preconceived configuration

The 1985 Code has been seen as an outdated attempt to introduce Modernism in Greek urban architecture (Velentzas et al., 1996, p100). This is true in the sense that it repeats Orthodox Modernism's indifference to the physical context of the building and treats the latter as a self-contained object of design. It is interesting that the Code was introduced in the 1980s, when this indifference has long been criticised and urbanity, as a quality of architecture, has been rediscovered. In Thessaloniki, the standardised

overexploitation of urban land of the period of intense urbanisation has determined the image of the city, and has almost obliterated any trace of historic identity. Nevertheless, the tradition of building individual urban buildings that contribute to the creation of an urban court or even a cluster of pavilions, albeit overdeveloped and cheaply constructed, can be argued to have created some 'sense' in the 'image' of the city (Lynch, 1981, pp131-150). The new GBC, instead, seems to encourage fragmentation of this image in the name of architectural creativity.

The plot ratio for the site is set by the General Urban Development Plan of Thessaloniki to 1.2. The office building, however, is permitted to build a plot ratio of 2.4, apparently because it faces a major arterial street. This difference, added on the freedom allowed by the GBC, completely eliminates any chance of integrity in this configuration.

The office building was built by a constructional company for speculation and not through the mechanism of *antiparochi.* Two of the buildings were built by the land owners for self-housing. In general, *antiparochi*, although still predominant, is gradually reducing its share in the city's building activity. This can be attributed to the following two factors:
- reduction of plot ratios has reduced the margins of profit for the developer. This factor is accentuated by the fact that plots available for development are situated away from the city centre and tend to have smaller permissible plot ratios.
- construction costs have raised dramatically since the introduction of the Thermal Insulation Code and other regulations setting standards for higher quality of construction. Thus, margins of profit for the developer are further reduced.

Between 1981 and 1991, the population of Thessaloniki increased only by 6% and that of the Municipality of Thessaloniki dropped by 5.5% (NSSG, 1995, p52). Rates of economic growth have also reduced remarkably since the 'miracle' of the 1960s. Between 1987 and 1993 the rate of annual growth of the GDP in Greece has been among the lowest in Europe (NSSG, 1995, p524). Industrial employment in Thessaloniki has stabilised since the mid-1970s (Leontidou, 1990, p112). In 1991, 57.9% of employment in the Prefecture of Thessaloniki was in the tertiary sector (Ministry of the Environment et al. 1995, p30). The objectives set by the *Strategic Plan* for the city in the 21st century are also indicative of a restructuring in the city's economic base. The plan seeks to forge a new identity for the city as a centre for business, production, science and culture.

Building activity dropped significantly. Buildings produced in that decade were almost 20% fewer than those produced between 1961 and 1971. Unauthorised building as a housing option for low-income urban populations has practically stopped to exist, after successive extensions of urban plans and legalisations of existing unauthorised settlements. As mentioned earlier, housing construction in urban Greece has been a thrust to the country's economy. It can be argued, therefore, that dramatic reduction in construction is related to reduced rates of economic growth. In an even more direct way, the former is also related to what Velentzas et al. (1996) identify as 'crisis of the housing market' in Thessaloniki.

The latter, in turn, can be partly explained by the crisis of the mechanism of *antiparochi* for the aforementioned reasons. Although a few big construction companies have started to emerge, buy land and build for speculation, this at the moment an insignificant percentage. There has not as yet a new mechanism been invented to replace the old one that is losing ground. The latter, combined with non-existent public investment on housing and a young and inefficient system of housing credit give to the situation the dimension of a crisis. The next urban configuration will further illuminate the interaction and, in the case of Greece and Thessaloniki, the incongruence, between institutional framework and economic and social structures in the production of the urban fabric. The suburban experiment will illuminate further the economic, social and environmental unsustainability of this lasting incongruence.

7.5. The Suburban Experiment

This configuration has not developed yet. Its site is situated in the Municipality of Kalamaria, which is situated to the East of the Fifth Department of the Municiplity of Thessaloniki.

7.5.1. Form

The site where this configuration will develop is on the Northwest - Southeast axis, i.e. its long sides are oriented Southwest and Northeast (see figure 7.1, p187). This, however, does not give an indication about how the buildings will be oriented as the latest GBC does not give constraints regarding the building's siting. According to the street plan that has not yet been realised, one of the streets surrounding the configuration will be 50 metres wide, and will be the main axis connecting Kalamaria to the city centre, and the rest will be 18m. These are much wider than all the streets

in the previous sections. The plots comprised in this site are, on average, also bigger and the site itself is the biggest among the ones examined in this chapter.

Kalamaria is the area where the middle-class of Thessaloniki moved in the 1980s. Flats tend to be bigger than in central areas and the ratio of owner-occupancy is over 80% and among the highest in Thessaloniki (Velentzas et al., 1996, p185). Average rent in this area is the highest in the conurbation (Velentzas et al., 1996, p208).

Figure 7.15. While development in the area bordering it is booming the area that is a designated Urban Development Unit has not developed yet.

7.5.2. Process

The area where this configuration will develop is defined by Law 1337/1983 as an Urban Development Unit or a Neighbourhood. As already mentioned, Law 1337/83 was a modification of Law 947/79. Although the former adopts a socialist rhetoric, the two laws are very similar in their basic tools and principles (Hastaoglou et al., 1987, pp167-173). Together they form the most ambitious attempt to introduce 'rational' modern urban planning, inspired by West European and North American experience, to Greece.

The concept of the quasi self-sufficient neighbourhood as the increment of urban development was introduced by 1337/83, through the term Urban Development Unit (UDU), and aspired to replace the well-established pattern of individual plot development. The process of development would be transformed fundamentally in three more ways. First, the initiative for designation of a UDU would be taken by the

local authorities that would also be responsible for carrying out the scheme, implementing it and, partially, funding it. Second, landowners would have to contribute a percentage of their land for public space and social amenities as well as an amount of money towards the costs of implementation. Thirdly, people affected by the development would participate in the process, through open meetings, and be constantly informed through the press.

Kalamaria experienced a 56.2% growth in its population in the decade between 1981 and 1991[19]. Hence, notwithstanding the crisis observed in building activity in the areas of the previous sections, Kalamaria experienced a building boom during the 1980s. In fact, 60% of all apartment buildings in the area were built after 1980 (Velentzas et al., 1996, p127).

The reasons why this piece of land has remained vacant, while construction in the area bordering it has been thriving, are many. One is that this area has only recently been included in the approved plan of Thessaloniki.

In 1983, the *Operation for Urban Restructuring* was launched in the country as well as the Law 1337/83 introducing new planning tools and replacing others which have been valid since 1923 and were obviously not corresponding to contemporary urban conditions. As part of this ambitious *Operation* and with the standards imposed by the new law, *General Urban Development Plans* (GUDPs) were drafted for most Greek cities. The GUDPs of the Municipalities of Thessaloniki's conurbation allowed 1,429 Hectares of extension of the existing 3,972 Hectares of approved urban plan. These extensions would be in the form of UDUs (Ministry of the Environment et al., 1995, p40). The specific area of Kalamaria is one of these extension areas (see figure 7.15). Each GUDP had to be complete with an Implementation Study before planning permissions begin to be issued. The Implementation Study of Kalamaria's GUDP has only recently been finalised.

The second reason, why the area has not been developed, was that the new planning tools introduced by the Law 1337/83 were to be implemented by a bureaucratic mechanism that was completely unaccustomed to them.

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[19] The population of Kalamaria increased from 51,676 people in 1981 to 80,698 in 1991. This represents the third highest growth ratio in the whole conurbation of Thessaloniki. Panorama has increased its population by 145% in the same period and Pylea by 73%. In terms of actual population increase however Kalamaria, being the second biggest Municipality in Thessaloniki, is the first (NSSG, 1995, p52).

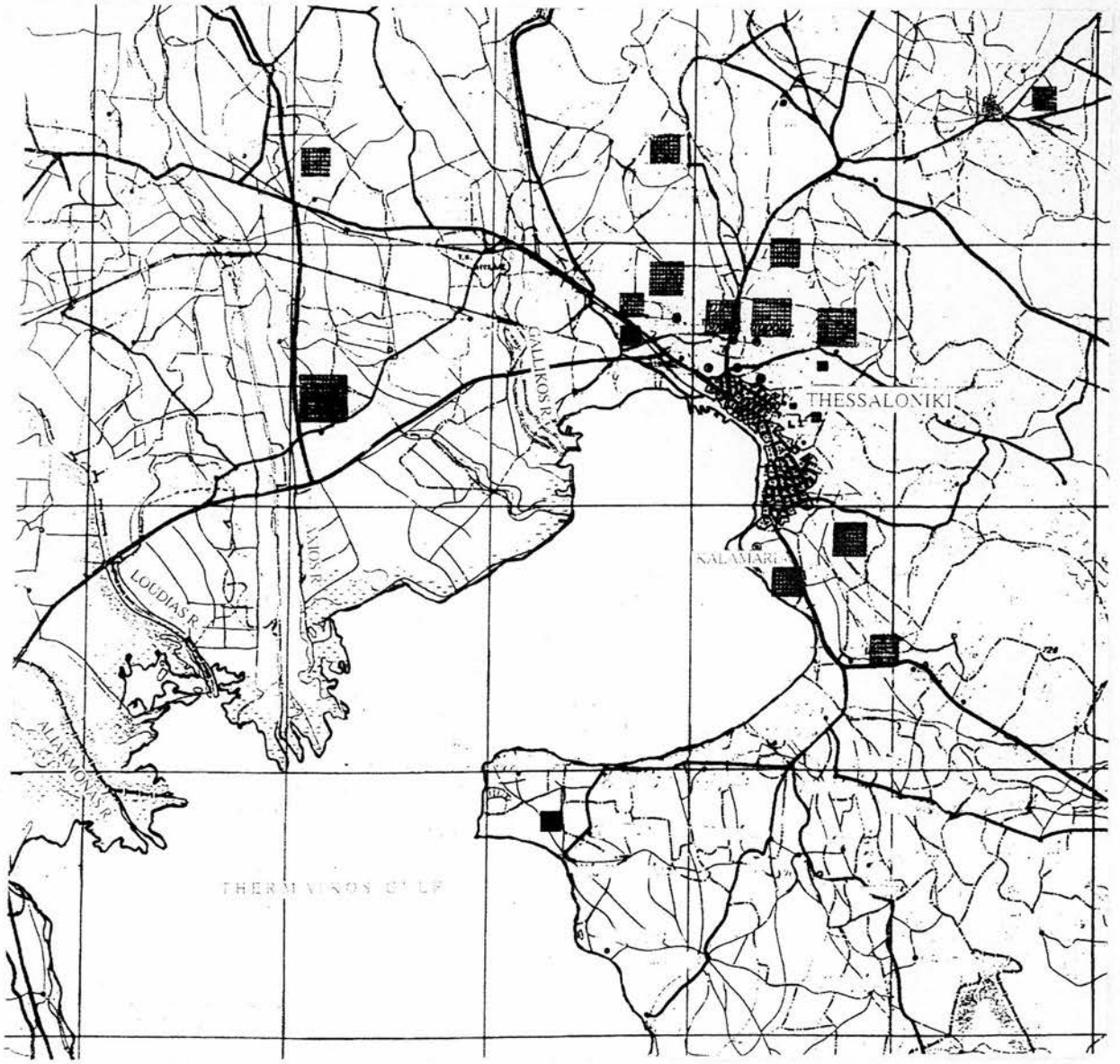

Figure 7.16. Extensions of the approved plan of the Thessaloniki during Operation Urban Restructuring (Ministry of the Environment et al., 1995)

Otherwise disempowered local authorities were charged with the task of initiating, designing, implementing and, partially funding UDUs.

Finally, public participation made things even more complicated. What was introduced as a revolutionary planning principle, degenerated to individual appeals *a posteriori*, i.e. only after the plan has been approved, and only on the grounds of private interests. This procedure delayed the implementation of the plan until now.

There are, however, still problems in the way the configuration will develop in the future. The maximum permissible plot ratio in the area is 0.80, which is the maximum

plot ratio set by the Law 1337/83 for all extension areas. This manifests an intention of the regulators to reduce densities of development, which is indeed a necessity for Thessaloniki. Mixed residential densities will also reduce considerably with the introduction of parks, social amenities and wider roads. Low permissible exploitation of land, however, discourages further the use of the mechanism of *antiparochi* or building for speculation by big construction companies. In this area, the percentage of the finished building required by the landowner when ceding his/her plot for development through *antiparochi* has increased dramatically from 33.66% in 1970-1979 to 46.13 in 1990 (Velentzas et al., 1996, p238). Therefore, building has become less profitable for the developer. It appears that self-building is the most probable way for this area to develop. This, however, is very expensive given increased costs of construction in addition to the compulsory money contribution imposed to all landowners in the area. The combination of these factors seems to be holding building activity and thus perpetuating the observed crisis in the housing market.

The Law does not provide any direction with regard to the physical fabric of the Urban Development Unit, other than the maximum plot ratio. The 1985 GBC applies homogeneously to the whole country, urban and rural. Potential for passive design of individual buildings increases with increased space available and increased freedom ceded to individual plot development by the GBC. Planning the level of urban configuration, however, is still meaningful for protecting solar access, controlling the microclimate, creating usable open spaces. It is also crucial for energy planning and the use of renewable and/or efficient sources of energy, like CHP.

Also, it is to be feared, that freedom given by the new GBC enhanced by the area's sizeable plots[20] will result in a haphazard urban form, lacking in 'identity' and 'structure', the two elements of Lynch's 'sense' of a city (Lynch, 1981, pp131-150). There is wide scope for controlling these performance dimensions at the level of urban configuration.

To conclude, notwithstanding official attempts for rationalisation of urban space, their combination with socio-economic circumstances seems to be unsustainable. In fact, 15 years after its introduction, the only cases in which the reforming Law 1337/83 has

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[20] Compared with areas from previous sections, plots in Kalamaria are bigger. Over 73% of Kalamaria's plots are bigger than 300 m^2, 69% in E' Municipal Department of Thessaloniki and 57% in A' Municipal Department of Thessaloniki. In Kalamaria 44% of the plots are over 400 m^2 big, compared to only 18% of plots in the centre of Thessaloniki (Velentzas et al., p134).

been genuinely implemented is in including already densely built, unauthorised settlements into approved urban plans.

7.6. Concluding Remarks

Although there have been significant transformations in Thessaloniki's building stock in terms of constructional quality, amenity, availability of housing and regulatory framework since the early 1960s, a linear process of improvement towards sustainability cannot be traced.

	Built between	Driving Legislation	Plot Ratio
1. the block of intense urbanisation	1959 - 1967	GBC 1955-73	4.8
2. the cluster of diffuse urbanisation	1973 - 1996	Decree 1970	-
3.the 'block' of economic restructuring	1985 - 1994	GBC 1985	1.2
4. the suburban experiment	not developed yet	Law 1337/83	0.8

Table 7.4. Urban configurations and their driving piece of legislation.

Tracing the evolution of the passive qualities of the fabric in four urban configurations, an increasing potential for passive design can be identified as a result of changing building and planning regulations. The passive qualities of the 'block of intense urbanisation' were highly conditioned by the street plan and the continuous building system which invoked low solar exposure and relatively low passivity. In addition, mass produced individual buildings did not respond to their respective position in the configuration to improve their passive potential. High permissible plot ratios and heights facilitated heavy obstruction of solar access. Finally, excessive breaching of permissible plot ratio, land coverage and height exacerbated the effect of the above.

Subsequently, the 'cluster of diffuse urbanisation' also determined the passive qualities of its constituent buildings. Through a different building system, it invoked higher solar exposure and passivity ratios than the previous configuration. This was not a conscious attempt towards passive design at the urban level but the by-product of an attempt to control urban image and open space more vigorously. This configuration exhibits the potential of maintaining the system of individual exploitation of small urban plots while controlling their combined urban effect, towards an image

Urban Configuration	Average energy requirement KWh/m_2/year (Unobstructed)	Average energy requirement KWh/m_2/year (Obstructed)	Increase in total energy %	Increase in energy for lighting %
Block of intense urbanisation	165.60	188.50	13	28
Cluster of diffuse urbanisation	159.60	171.33	9.5	27
'Block' of economic restructuring	193.50	-	-	-

Table 7.5. Annual energy requirements of the three urban configurations, calculated with the LT Method.

with 'structure' and 'identity' and a usable open space. This potential was developed at a very basic level by the decree that created this configuration, dictating uniform heights and volumes and a unified open space without any other observable mandate. More levels of sophistication could have been added on this. Passive solar design could have been one of them.

In contrast to the previous configuration, the 'block of economic restructuring' abandoned control of the level of the urban configuration altogether and let individual buildings develop freely. The mandate in this case is only protection of development rights of adjacent properties as well as of public place. Passive qualities of individual buildings and their interaction with other constituent buildings are not determined by the configuration. The type and level of interaction between constituent buildings is not controlled. Unless a mandate for better energy performance at the level of urban configuration is superimposed to the present level of regulation it can only seen as offering potential but not actual improvement. The same is true for the last configuration. Notwithstanding lower densities of development induced by lower permissible plot ratios, issues of microclimate, urban image and function and energy planning still require control at the level of the urban configuration.

The creation of the first configuration has been dictated by planning and building regulations and modified by unauthorised extensions facilitated by a mixture of economic necessity and institutional vagueness. The second configuration was a conscious attempt to control the interaction of individual buildings in terms of urban image and open space. The third and fourth represent a free-market approach to the urban fabric which allows it to develop as an aggregate of individual buildings with no preconceived relationship to each other.

In economic terms, the block of intense urbanisation and, to a lesser extent, the cluster of diffuse urbanisation have thrust the economy and have covered housing needs. Instead, the block of economic restructuring and the suburban experiment have contributed to a housing crisis as their lower exploitation ratios and higher costs of construction hindered building activity.

This chapter attempted to illuminate the interaction between physical form and human processes focusing on four urban configurations of Thessaloniki and juxtaposing their physical attributes with their process of production. Their relation varied from synergy for growth in the period of intense urbanisation to a marked incongruence in that of economic restructuring and hindrance in the case of the suburban experiment. To conclude, it may be said that the process of transforming the urban fabric towards sustainability is not merely one of manipulating form through building and planning regulations. It is also a matter of designing a process of production which is responsive to, rather than imposed on, social and economic as well as environmental circumstances. Reflexivity, as Chapter 8 will try to show, needs to be a definitive theme of this process, to cater for the dynamic, rather than static, nature of these circumstances and ensure the necessary 'respect for reality' (Philippides, 1990, p256).

chapter eight

CHAPTER 8

REFLEXIVITY: TOWARDS A FRAMEWORK THAT 'RESPECTS REALITY'

8.1. Introduction

This chapter looks at urban sustainability as a 'management project' (Carley and Christie, 1993). It seeks to establish reflexivity as a prerequisite and a constituent of sustainability of Thessaloniki's fabric. In other words, this chapter suggests that, in order to be instrumental to change towards sustainability, the management process of Thessaloniki's development needs to become 'its own theme' (Beck, 1986).

As the previous three Chapters have shown, the unsustainability of the city of Thessaloniki is causally linked to a planning framework that fails to respond to its physical and non-physical context. Administrative compartmentalisation, vague and overlapping agendas of different departments and levels of administration, disempowerment of local authorities by a centralised state exacerbate this enduring detachment from reality and ensure perpetuity of the framework.

In the end of the 1990s, the need for the management process of Thessaloniki's fabric to be reflexive is accentuated by the need to respond to changing economic circumstances, environmental problems, technological developments and institutional frameworks. A historic development with a potential bearing in Thessaloniki's economic development is the fall of communist regimes in Eastern European countries. The latter has been often seen as an opportunity for the city to assume the role of a financial and a technological centre in the Balkan Peninsula.

At a European level, Thessaloniki features marginally at one only of the four scenarios predicting four possible futures for the regions of the European Union (Ministry of the Environment et al., 1995, p33). Asserting a role in Europe will require informed responses to a number of economic and institutional changes, operating at European level.

Thessaloniki produces 17% of the total industrial production in Greece (Stamelos, undated) and 9.1% of the country's GNP (Velentzas et al., 1996, p61). Hence, it can be said to play a very important role in Greece's national economy. However, as economy becomes more and more globalised and the sovereignty of the national-state

becomes challenged (Castells, 1997), individual cities world-wide are affected in physical and non-physical terms. Thessaloniki is not a 'global city'. It has, nevertheless, experienced the effects of global economic restructuring, mainly in the shift of the basis of its economy from industry and construction to services (Leontidou, 1990).

Development and expansion of telecommunication networks is another globalising agent with localised effects. Their possible effects on urban development are not yet clear. Notwithstanding futuristic scenarios of dematerialisation or negation of the spatiality of cities, Sassen (1994) maintains that, telecommunication technology, and the global economy it facilitates, strengthens urban spatiality. As effects cannot be predicted, a framework aiming at Thessaloniki's sustainability needs to be sensitive to changes and able to respond to them.

'The risk society', i.e. a society that has to deal 'with hazards and insecurities induced and introduced by modernisation itself' (Beck, 1992, p21), creates the imperative for a reflexive framework of management for the future of Thessaloniki. Urban policy, however, cannot be seen in isolation from the general administrative structure of state policy in Greece. The latter provides the operational framework in which urban policy is produced and practised and, hence, is responsible for many of its dysfunctions. Transformation of the urban fabric of Thessaloniki needs to form part of a new 'differential politics' (Beck, 1992, pp231-235) rather than limit itself to purely regulatory changes in building codes and planning regulations. This thesis, however, does not offer an appropriate setting for the operational principles of a 'differential politics' for the Greek context to be explored. It acknowledges the obsolescence of the existing operational principles in view of the 'risk society' and highlights the irreflexive nature of the institutional framework of production of Thessaloniki's urban fabric, as a part and an outcome of a centralised state policy. Subsequently, it proceeds to suggest the means, at the level of principles, that could introduce reflexivity to this institutional framework by increasing its 'respect for reality'. It is beyond the scope of this thesis to investigate the actual administrative and regulatory changes required.

8.2. The Nature of Irreflexivity

Environmental awareness in Greek legislation was introduced by the *Environmental Protection Act* in 1986, the transposition of all European Union Laws and Directives and the country's commitment to a number of international treaties and conventions, notably to *Agenda 21* towards sustainable development. Official urban planning has been revolutionised through a massive national operation, launched in 1983, aiming at restructuring urban space in the whole country. In 1985, Thessaloniki's *Master Plan* attempted to rationalise the operation and control the development of the Greater Thessaloniki Area. It was launched in parallel to the *Programme for the Protection of Natural and Built environment. of Thessaloniki.* At a smaller scale, *General Urban Development Plans* of the city's several Municipalities included extension areas planned as quasi self-sufficient neighbourhoods. Four Municipalities of Thessaloniki's conurbation collaborated and produced a joint programme towards sustainable urban development for Western Thessaloniki, in response to their commitment to *Agenda 21* and under the auspices of the European Union (Municipality of Stavroupoli, 1995). Finally, the Ministry of the Environment Physical Planning and Public Works is currently exploring opportunities of reducing emissions of CO_2 and other greenhouse gases by inducing passive solar design to individual buildings through the General Building Code (Ministry of Environment etc., 1995).

The above developments signify the existence of a clear environmental mandate in a multitude of scales of reference, linking the national to the local. Nevertheless, they cannot be said to constitute a concerted multi-tier programme towards urban sustainability. Revolutionary as they may be in their objectives and tools, all the above are entrenched in the existing administrational structure and essentially the same operational processes. Notwithstanding their acknowledged ineffectiveness, the latter two are not addressed in programmes of reform. Instead, (Carley and Christie, 1992, p161)

> ...most politicians and bureaucrats involved in public decision making and management have little interest in improving the processes of decision making and indeed, little interest in considering the processes at all. ...There are few votes in reviews of management and administration, progress takes time and politicians seldom look past the next election. Bureaucrats have little motivation to upset the status quo.

The status quo is protected, rather than upset, by the tools and policies it employs. As already mentioned, Greek urban planning is permeated by abstract preconceptions of

international urban planning and architecture and not with the specific spatio-temporality of urban Greece. The fabric is not addressed as a particular spatio-temporal formation but as abstract and strictly spatial. Changes in building and planning regulations do not respond either to the physical characteristics of the urban fabric or to the socio-economic forces that shape it. In other words, the official production process of the urban fabric is detached from reality.

'Respect for reality' is what Philippidis (1990, p256) suggests as the way forward for Greek urban planning, referring to the need to discard imported 'ready-made prescriptions' and depart from the cult of the 'plan' as the end of the planning process. Tracing the history of post-war Greek urban planning, Philippidis concludes that, its failure to have any effect on Greek urban reality is not just a symptom of its ineffective policies and plans. It is a structural component of the official planning mechanism. This mechanism, Philippidis suggests, is not really intended to intervene upon urban space. Rather it is intended to create the illusion of political action towards social welfare, without actually doing anything but producing 'plans' that cannot be implemented.

The official procedure for producing *General Urban Development Plans* (GUDP) exemplifies the above. The lengthy and unnecessarily complex official instructions towards production of GUDPs do not require any reference to the plans' process of implementation, e.g. timetable and phases of implementation, possibilities of funding, etc. They only give instructions with regard to the production of the plan. Rather than being instruments towards change, GUDPs themselves become the end, offering a scientific veneer to state policy, but no means to transform cities.

Inherent resistance to change and intentional reproduction of existing patterns of organisation also explain the official stance towards unauthorised settlements and excessive breaching of development rights. It is the very vagueness, complexity and unrealistic nature of state planning policy that facilitates the existence of illegal planning. The latter, instead, is direct, efficient and responds to tangible problems. Inconsistency and ineffectiveness of policy towards illegal planning can, thus, be interpreted as tolerance towards it or even encouragement. Indeed, it is more economical to the state to include *a posteriori* unauthorised settlements into approved urban plans and to provide them with basic infrastructure, than to build legally planned extensions (Philippidis, 1990, p230-245).

In short, it can be said that ineffectiveness of urban planning in Greece is not a symptom of misguided action but rather an inherent feature of its organisational structure. Its consistent detachment from socio-economic and physical reality and its 'updating' according to imported, rather than Greek, standards is not simply misinformed choice of planning tools. More than that, it is a guarantee of continuity for existing structures, legitimated by transposed, 'scientific' and, hence, supposedly neutral, planning choices.

The process of shifting towards sustainability requires reversal of the above. Rather than containing the means of continuity, a framework should contain the means for its own transformation. This transformation should be responsive to changes in the physical and socio-economic reality of Greek cities. In other words, Greek urban planning should substitute mechanisms that expose it to real problems for its imported, purely spatial and socially detached solutions. The rest of this chapter discusses the means, at the level of principles, of introducing reflexivity to the official process of production of the urban fabric of Thessaloniki.

8.3. 'Respect for Reality'

8.3.1. Reflections of the Means

As Chapter 7 tried to establish, physical characteristics of the urban fabric do not represent their respective building regulations alone, but also their respective socio-economic and institutional circumstances. Any attempt to influence the fabric's production process towards sustainability, would have to identify urban policy as part of the wider administrative structure that conditions it. In other words, in view of the plea for a sustainable urban fabric, it is not simply a new urban policy that is required. It is a new kind of politics.

The means introduced in this section are relational rather than exclusive. Boundaries between them are blurred and adoption of one in isolation would be futile or even impossible. Essentially, the aim of all four proposed principles is encapsulated in the following quotation from Beck (1992, p234). The aim is:

> the extension and legal protection of certain possibilities for sub-politics to exert influence. ...things that until now have only been able to make their way with great difficulty against the dominance of professions or operational management must be institutionally protected: alternative evaluations, alternative professional practice, discussions within organisations and professions of the consequences of their own developments, and repressed scepticism.

'Enabling self-criticism' of policies, professions and organisations, institutionally, is a definitive theme in Beck's 'differential politics' and 'the only way' to respond to the 'risk society'. The organisational principles highlighted below aim at establishing self-criticism as an operational characteristic of the production process of Thessaloniki's urban fabric.

Greece, in a similar way to other Southern European countries, has a very centralised administrative structure which leaves little power, institutional or financial, for intervention to local authorities or any other local agent. Central administration is inherently bureaucratic and inflexible. Operating within this administrative structure, Greek urban policy exhibits the same centralised and inflexible nature. Its only sign of flexibility can be said to stem, not from any institutional constituent, but from corruption. Corruption is the mediator between official policy and unauthorised buildings, illegal extensions and breached regulations and development rights (Philippidis, 1990, p242). Through this mediator, however, the system becomes responsive to private interest only and not to social welfare or the need for environmental protection. In turn, unauthorised building and breached regulations can be seen as the only expression of public participation in the process of production of the urban fabric. In general, the system's resistance to change is strengthened by centralisation and its sclerotic structure perpetuated as no agent, other than isolated private interest, has the institutional power to effect it.

Regionalisation

The first means of introducing 'respect for reality' is a response to the centralised nature of national urban policy. Regionalisation refers to the empowerment of lower levels of administration for meaningful action in their respective scales. Special emphasis is given to the smallest, i.e. that of the local authorities, which is closest to urban issues and, hence, can become the most responsive to their dynamic changes.

Regionalisation, however, needs to be inclusive rather than exclusive. In other words, while increasing the potential for local action responsive to local trends, it also needs to link this action to processes - environmental, social, economic - that operate beyond the boundaries of the local government's physical territory. Therefore, regionalisation of governance does not imply either disconnected action or relativism of policies.

Agenda 21 promotes local authorities as the scale of administration appropriate to pursue policies towards global sustainable development and the Maastricht Treaty of the European Union endorses the concept of subsidiarity as an objective of European policy. Subsidiarity requires that 'collective responsibilities should be assigned to the lowest level of government competent to assume them effectively' (Gilbert et al., p27). The irrelevance of the *Green Paper for the Urban Environment* to Greek and South European cities is a testimony to the need of subsidiarity (see Chapter 2).

Empowered local authorities also have increased potential, compared to national governments, to become inclusive in terms of the sectors of the society they include in their decision-making processes and actions (Gilbert et al., p29).

Regionalisation of planning regulations and building codes, of their production, level of reference, as well as of their management and control mechanisms, can be generated and accommodated by strong local governance. This will increase their sensitivity to the specific spatio-temporal features of specific cities.

Integration

The second means is a *sine qua non* to the first and refers to the need for co-ordinated rather than fragmented action. Genuine communication and collaboration in a vertical manner i.e. among all levels of administration - extended upwards to international bodies and downwards to the grassroots - is crucial. The multi-tier nature of the concept of sustainability, which connects the household to the global, demands the invention of mechanisms to operationalise these links in practice. In parallel, horizontal communication between administrative departments will also help increase exposure of the process to reality. It should facilitate understanding of problems' actual components rather than of those preconceived within established scientific domains. The treatment of Thessaloniki's domestic wastewater, a problem spanning disciplinary and administrational boundaries presents a typical example of compartmentalised understanding and action on the side of the various agents[1].

[1] Pollution of Thermaikos, of the estuary of the protected wetland of Axios, of the air with methane (a potent greenhouse gas), increased pressure for landfill sites are some of the environmental issues at stake. The above span several Municipalities and Communes of the Greater Thessaloniki Area, and also levels of administration up to the European Union - who introduced a Directive for treatment of urban domestic wastewater and also funded the treatment plant - and international treaties (Ramsar Convention).

Within the sustainable cities discourse the need for integration of certain departments - e.g. energy, transport and land-use planning - is already well established. Facilitation of operational links between sectors of administration is bound to unveil more and ever changing alliances, depending on the problem.

Flexibility

The third organisational principle suggested towards reflexivity is flexibility. In the ongoing debate contesting state regulation with market-based instruments towards environmental protection there does not seem to exist an exclusive answer. The efficiency of each policy has to be evaluated against the specific context in the specific point in time[2]. As Philippidis points out 'we will never and nowhere have a theoretically clear form of intervention'. Therefore, it is important to identify appropriate tools for specific problems, 'even if we are in danger of indulging to infamous empiricism' (Philippidis, 1990, p256). For example, partnerships with private businesses, widely practised in the United Kingdom for projects of urban regeneration since the mid-1970s[3], may be instrumental in enabling local authorities to intervene. This would not imply wholesale endorsement of free market environmentalism.

Public Participation

Finally, the most important guarantee for 'respecting reality' and hence enabling the process to respond to it, is participation. In view of the globality of environmental problems and economic processes, the 'bottom-up' approach to environmental change propagated by many commentators in the 1970s needs to be revisited and updated. 'Small' community initiatives with specific environmental - or social - mandates need to shed their 'militant particularisms' (Harvey, 1997) and form a powerful part of a wider network of approaches vertically and horizontally. Participation, in this context, implies exposure of the management process towards sustainability to all sectors of society both as a way of defining problems and of addressing them. Businesses, universities, NGOs and stakeholders at the grassroots should be enabled institutionally to contribute their perspective and action in a non-hierarchical and transparent way.

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[2] Vertical and horizontal integration and public participation will ensure that regionalisation and flexibility do not legitimate relativism.

[3] Partnerships with businesses emerged in the United Kingdom in the 1970s and have become established as a vehicle of urban regeneration. In a period when economic restructuring made the need of regeneration of inner cities of old industrial centres pressing, local authorities were deprived of their power to intervene by an increasingly centralising state. Partnerships enabled local authorities to pursue urban regeneration, while being consistent to the conservative government's free-market approach to urban policy(see Bailey, 1995).

The way participation has been introduced in Greek urban planning is yet another expression of its irreflexivity. Law 1337/83 about urban extensions requires that the Municipality or Commune that initiates the process of producing a GUDP should 'seek participation of citizens ... in every appropriate way e.g. public meetings or by informing them through the press'. This being all that is specified by the Law, participation did not operate before GUDPs were in the process of implementation, in which case individual appeals against them on the grounds of private interests were the only public response. This dysfunction is related to the Law's complexity and its emphasis on the production of GUDPs, rather than their process of implementation. It is also related to the Local Authorities' lack of experience in consultative planning. Finally, to people's lack of confidence towards the state, most notably towards its urban policy, prevented genuine participation. Increasing the credibility of official Greek urban planning involves increasing its responsiveness to real problems of real places, and hence, it effectiveness in managing them.

Regionalisation, integration, flexibility and public participation are organisational principles aiming at addressing the irreflexive nature of the official urban planning process in Greece by grounding it firmly on its spatio-temporal context. Established or emerging tools for updating environmental policy and measuring progress toward sustainability can be accommodated in the reflexive 'network' that these principles evoke, in replacement of the sclerotic 'plan' that has hitherto dominated urban planning in Greece (Carley and Christie, 1994, see Chapter 1).

8.3.2. A Network for the Urban Fabric of Thessaloniki

The need to inform Thessaloniki's planning process with a clear mandate towards sustainability was established in Chapter 5 using the metaphor of the ecosystem as tool. The same metaphor revealed the pivotal role of Thessaloniki's built fabric in the city's unsustainability. This section investigates the 'operational tactics' of a reflexive 'action-centred network' 'grounded on the real problems' (Carley and Christie, 1992, p184-201) of the urban fabric of Thessaloniki.

As mentioned earlier, the Greater Thessaloniki Area, to which the *Master Plan of Thessaloniki* refers, consists, in terms of administration, of 13 Municipalities and 54 Communes. *General Urban Development Plans* (GUDPs) were introduced into national urban policy by the nation-wide *Operation Urban Restructuring*. Subsequently, each GUDP was initiated individually by one or a combination of more

local authorities and created in most cases by the local Department of the Ministry of Planning and the Environment according to instructions given in Law 1337/83. At present, GUDPs have been prepared for all administrational divisions of Thessaloniki's conurbation. As yet, however, only a few of them have officially approved Implementation Acts. GUDPs do not have any forcible power. Unless complemented by Implementation Acts, they are advisory, rather than legislatory, plans. Hence, development in Thessaloniki still defies intentions stated in its GUDPs.

The same is true for the city's *Master Plan* which was conceived as a way to overcome the fragmented nature of GUDPs and control the development of the city as whole in its region. The *Organisation for the Master Plan* was created with a view to co-ordinate the various local authorities and other administrative bodies in order to promote implementation of the *Master Plan*. The bureaucratic nature of the *Organisation* itself and the lack of consensus across all sectors of administration and society with regard to the objectives of the *Master Plan* resulted in dilution of its original objectives. It also resulted in the *Organisation* operating as yet another state authority, isolated from the rest and from its social context.

Finally, the *Strategic Plan of Thessaloniki*, a rare example of collaboration between public administration and the local university, has no forcible power. It is only an advisory document for the several state authorities concerned with Thessaloniki's future. The *Plan* encourages genuine communication between different authorities, levels of administration and the private sector as a means towards promoting its objectives. Social consensus is identified as crucial for the implementation of any plan. Nevertheless, the *Plan* itself, set in the general operational structure of state administration and lacking the social consensus it advocates, faces the danger of remaining an inactive proposal.

Therefore, it can be concluded that all three tools, specifically created to control the future development of Thessaloniki, the *Strategic Plan*, the *Master Plan* and the GUDPs, have either diluted their original objectives when encountered with reality or are virtually inactive because of organisational obstacles symptomatic of Greek bureaucracy. All three plans have to be implemented by the state. Conversely, the codes and regulations that control the city's increments of development, i.e. individual apartment buildings, are being implemented, marginally or inaccurately, by the private sector, notably by developers. Thus, it is the private sector which determines cumulatively the image as well as the social, economic and environmental function of

the city. Codes and regulations that control the development of individual buildings, however, refer indiscriminately to the whole of rural and urban Greece and are not equipped with any mechanism to relate to specific circumstances of any kind, be they climatic, socio-economic, historic or aesthetic.

Effective links between the *Strategic Plan*, the *Master Plan*, the GUDPs and building and construction codes and their respective management processes, need to be established, in order to bring the general objectives of the plans to the level where development actually occurs. Developers, who are responsible for practically all building construction in Thessaloniki, may thus participate to the process of pursuing the objectives of the Plans, rather than working incrementally against them. Plot owners and residents can also participate actively in a scale in which they have a direct personal interest, in financial and environmental terms. The introduction of 'no-regrets' policies, i.e. policies aimed to protect the environment without inducing financial or any other burden, can reconcile the objective of environmental protection with that of economic development. In Greece, a country with one of the highest percentages of owner-occupied residences in Europe, 'no-regrets' policies have a wide scope of application, as the same people are likely to enjoy the long-term benefits of a present regulation or investment to retrofit.

Integrating building and construction codes with the city's large scale plans will not only promote their long delayed implementation through a smaller and more dynamic scale. It will also illuminate the neglected role of the fabric in the city's operation (see Chapter 5) and hence will transform the plans' objectives and tools from within. At the same time, building and construction codes will be transformed to promote specific objectives of specific cities.

The need to control the cumulative effect of individual buildings, their urban effect in environmental, social and economic terms may emerge as a result of integrating urban plans and building codes for Thessaloniki. The scale of urban configuration will, hence, be addressed, regulated and informed with a mandate towards sustainability. Addressing this scale through changes into the regulatory framework, i.e. 'top-down', could be both the outcome of the 'network for the urban fabric of Thessaloniki' and its facilitator. Urban configurations, as minimum materialisations in space of a variety of institutional, economic and social processes, contain the potential to facilitate communication between the different agents with direct and perceivable interest in their development and their cumulative effects. 'Top-down' induced change, therefore,

could become the facilitator of 'bottom-up' action, as well as, of communication with 'outside' agents, e.g. developers, construction companies etc.

The shift from the individual building to the urban configuration could accommodate non-hierarchical collaboration between the stakeholders, i.e. the plot owners, the users, the developers and the planning authorities from the stage of decision-making to that of construction and management. A mandate towards a sustainable urban fabric will involve collaboration with all utility companies, e.g. water companies (to investigate the possibility of collecting rainwater or recycling grey water as a way of reducing the need for water), Electric Power Corporation, (to explore possibilities of installing CHPs or retrofitting buildings with photovoltaics to reduce demand on electricity), etc. (horizontal integration). Involvement of the building materials' industry and of construction companies is also a prerequisite.

The other stakeholders to the transformation of the fabric's form and process, also need to be identified, the potential contribution of each needs to be mapped and their participation ensured institutionally. The latter involves institutional power and expertise devolved to the different municipalities of the conurbation (subsidiarity) and operational links between them as well as between them and all levels of administration (vertical integration).

To sum up, the role of the state would be significant in initiating the 'network for the fabric' through its commitment to urban sustainability and through informed choices leading to the integration of planning tools and building codes and the regulation of the scale urban configurations. Nevertheless, the reflexive operation of the 'network' towards an environmentally, socially and economically sustainable urban fabric would require more that 'top-down' regulation. It would require what political theorist Janicke [1990, as presented by Eckersley in Eckersley (ed.), 1995, p20):

> new institutional forms of 'countervailing power' from above ('consensual planning, initiated by the government), from below (citizens), from outside (marker innovators) and from within (institutional reform within bureaucratic agencies).

The 'network' for the fabric would need to be constantly informed by the previous three principles towards sustainability suggested in this thesis, contextuality, appropriateness of scale and reconciliation of form and process. At the same time, though, it would inform them and enhance their scope and practicability, in a cyclical

process. Although specific administrative and regulatory transformations, or specific forms and technical requirements cannot be suggested in the context of this thesis, shifts towards sustainability, that can be accommodated in a reflexive 'network' for the city's urban fabric, will be highlighted.

The ***Strategic Plan*** may broaden its exposure to reality and its potential to influence it. It will become consensual and dynamic, as opposed to exclusive and static, by initiating a process of wide public consultation with regard to its strategic objectives about the city. It may recognise the significance of the city's fabric to drafting as well as pursuing any programme towards Thessaloniki's sustainable development. The stakeholders of a network will be recognised by the *Strategic Plan* as well as the institutional operational links between them. In general, the *Strategic Plan* will focus on determining 'operational tactics' and ensuring their operation institutionally.

The ***Master Plan*** can set the specific environmental, social and economic goals to be pursued through the network. These goals will also be the consensual product of wide public consultation. Their pursuit will depend on many agents acting in co-ordination.

GUDPs, which designate street plans, land use and transport planning, plot ratios, open spaces and social amenities, will be co-ordinated with each other and express the objectives of the *Master* and the *Strategic Plan*. Informed by the previous principles towards sustainability, a sustainable urban configuration will be the target of GUDPs on the outset.

Street plans of new extension areas, i.e. the orientation and width of the streets, should encourage maximum insolation of buildings and streets in winter months. Orientation of streets can also control the effect of the prevailing winds on the urban microclimate and the dispersion of atmospheric pollutants.

Land-uses can be designated at the level of urban configuration to encourage energy balance between uses with different energy requirements and hence distribute energy loads evenly and avoid peaks. The viability of CHP plants and active solar technologies can also be planned at this level.

Planting can be designated or encouraged to control the microclimate of intermediate spaces, and incrementally reduce Thessaloniki's atmospheric pollution as well as the

phenomenon of the urban heat island in the city. Increasing the amount of urban pervious surfaces by planting may also have an effect on the city's water cycle, by reducing run-off and increasing underground water replenishment.

The **building system**, i.e. the relationship between individual buildings, will encourage high passivity, low solar obstruction, usable intermediate spaces with favourable microclimates. Thus, it will be pursuing the general goal for energy conservation which could be one of the objectives of the *Master Plan*. **Plots ratios** and **permissible heights** will be controlled also at the level of the configuration to encourage concurrent or, at least, concerted development of constituent individual buildings, as well as, to inform the form and performance of their cumulative effect.

Building regulations controlling the development of individual buildings will encourage passive heating, daylighting and cooling and control individual volumes with respect to the rest. **Construction standards** will encourage use of recyclable non-toxic materials with low energy content, coming from local sources. Both bodies of regulation will have mechanisms to adapt to the specific goals of each GUDP.

The process of production of the urban fabric needs to be initiated and pursued locally to ensure participation of all local stakeholders to all stages of development. It needs, however, to form part of an 'action-centred network' that informs it, enhances its potential and co-ordinates it with processes at different levels and fields. Within this network 'self-criticism' and, therefore, reflexivity will be institutionalised, through the principles of regionalisation, integration, flexibility and participation. 'Respect for reality', responsiveness to the dynamic nature of the 'risk society' will be facilitated.

8.6. Concluding Remarks

Reflexivity is intended to ensure that Thessaloniki's framework towards urban sustainability is responsive to the dynamic changes of the city's spatio-temporal context. The means towards reflexivity, suggested in this chapter, require changes in the realm of urban planning, initiated by the state, to be concerted with wider institutional changes. As part of other state initiatives with regard to urban sustainability, regulatory focus on the scale of urban configurations is suggested as a facilitator of change of the production process of Thessaloniki's urban fabric, as well as of its form.

The administrational structure that would be induced by the organisational principles suggested in this chapter is constantly informed by all sectors of society, all departments and levels of administration to ensure its responsiveness to reality and, hence, its effectiveness. The structure responds to the reality of complexity and interdependence of urban issues and their emerging global interconnections that render existing administrational boundaries and state mechanisms obsolete. Nevertheless, such a structure is so distant from the centralised bureaucracy that is operating at present that can be accused of being utopian. Its difference from the proposals of the sustainable cities discourse, criticised in the first part of this thesis, is that the changes required in the framework of reflexivity are gradual, consensual and open to constant redefinition. These changes intend to outline 'a living Utopianism of process as opposed to the dead Utopianism of spatialised urban form' (Harvey, 1996, p436).

CONCLUDING REFLECTIONS AND FURTHER RESEARCH

This thesis sets out by raising a number of questions with regard to the theoretical content and practical value of the concept of sustainable development. The emergence of the concept is identified in visionary anti-growth programmes widely propagated in the early 1970s, which in turn were bred in the utopian socialist and anarchist tradition of the 19th century, and in the late 18th century Malthusian scenario of global catastrophe. Notwithstanding recognisable links between sustainable development and the above traditions, it would be inaccurate to suggest that the current concept is a product of a linear evolutionary process. There are qualitative deviations from both the theoretical meaning and the practical means of pursuit of early expressions of sustainability.

Nevertheless, a definitive feature of sustainability that is traced consistently in its former and current expressions is its global scale of reference. This feature is, at present, reinforced by developments in information technology and the global operation of the economy, and most notably by increasing awareness of the global dimension of environmental problems. Although global social and economic sustainability is also sought for, the need to respond to global environmental processes that threaten the future of a shared finite planet, and hence of human life on it, create the main rationale for a 'global project'. Such problems, like the accumulation of carbon dioxide on the atmosphere, the depletion of stratospheric ozone and rapid population growth are at the centre of international concern and are substantiated by international scientific research. The latter is expected to create a consensus among scientists with respect to the nature of the problems and their importance for the future of the planet. In turn, guidelines for policies towards sustainability are informed by scientific research and shaped accordingly. Thus, objective and impartial scientific 'facts' attest to the imperative for all people of the globe to act in unison for the future of a planet of 'natural limits'. Science, however, as developments in its own domain have shown, is neither objective or impartial. It is not devoid of social and political directions either. The global project of sustainable development depends upon an outdated idea of science to vindicate its universal nature.

Guidelines for policies towards sustainable development, recommended in international documents, like *Agenda 21*, are substantiated on the same grounds of scientific impartiality and common interest - and responsibility - to protect a finite

planet. The majority of guidelines are addressed to national governments of the developing world. For the sake of the planet, and with the help of the developed world, these countries are asked to abandon the resource-intensive and waste-producing course of development that made the developed world prosper. The burden of saving the earth falls disproportionately on poor countries, which have contributed the least to the creation of its problems.

Despite their scientific substantiation, problems that have gained prominence as potentially affecting human life on earth, can be shown not to have equally shared effects world-wide. The intensity of their effects are contingent to different physical and socio-economic circumstances. Moreover, the choice of problems recognised as global is not indisputable. There are environmental problems, equally global in scale to, say, ozone depletion or loss of biodiversity, but typically experienced by the poor of the developing world. Those have not gained equal prominence in the sustainable development discourse. In short, sustainable development, both the concept and the practice it engenders, responds more to scientifically demonstrated global processes potentially threatening the future of the planet, than to widely felt environmental problems affecting present human lives. Notwithstanding its scientific grounding, this preference can be seen as containing a bias in favour of the developed world.

The above analysis of the global nature of sustainable development is meant to improve understanding of the concept of urban sustainability, which is the focus of this thesis. The sustainable cities discourse is, to a large extent, a response to the global dimension of the concept of sustainable development. Cities emerge as an appropriate scale of pursuit of the global goal. Their current operation, which poses a major burden on the local and global environment, needs to be redesigned with a view to establishing a 'symbiotic' rather than a 'parasitic' relationship with nature. The sustainable cities discourse creates a new conceptual framework for the city, within which urban issues are seen as interacting components of an integrated urban system, set in its natural context and ultimately the biosphere.

The holistic view of the city propagated by the discourse, as opposed to the fragmented view fostered by orthodox modern planning, can be seen as its major contribution to the study and management of cities. Organic metaphors, like those of the organism and the ecosystem, are often employed within the discourse, with a view to emphasising the organic interdependence among urban processes and between them and the global ecosystem.

At the same time, however, these metaphors accommodate a universalistic approach to the variety of problems of the cities of the world. The problems identified as threatening the sustainability of cities and the globe have crystallised to a list of issues, most of which arise from the study of a city as an organic entity that needs to resolve its relation to its local and global natural context. Stimulated by the sustainable development discourse and characterised by the same theoretical problems, sustainable cities discourse focuses disproportionately on the strictly environmental aspect of sustainability, most notably on the impact of the 'urban ecosystem' on the surrounding and global environment.

In a similar way that the goal of sustainable development depends on scientific 'facts' to vindicate its globality, the sustainable cities discourse employs biological metaphors to grant universal validity to its approach to the city. Such an approach, however, deprives the city of its social, economic, political and cultural, i.e. its temporal, dimensions and reduces it to a strictly physical entity. The latter is most starkly demonstrated in the search for the sustainable urban form.

Responding to the new conceptual framework for cities, a number of models of urban form have been suggested as conducive to urban sustainability, as an environmental, social and economic goal. While the respective merits of these models are still discussed at an academic level, in many occasions, they have already been endorsed by national planning frameworks and international guidelines for sustainable urban development.

Without endorsing or rejecting the potential merits of any of the models, this thesis embarks on a critique of the way urban form has been approached in the discourse. It is argued that, most proposals towards sustainable urban form share certain intellectual problems that reduce their instrumentality to change. To begin with, most proposals are specific spatial forms, like the compact city, the self-contained neighbourhood and the durable building, induced through planning regulations and/or economic incentives. Their merits are validated on the grounds of reductionist measurements of their physical characteristics, e.g. urban density, and of the extent to which they can affect human behaviour towards sustainable urban living. This emphasis on the physicality of urban form fails to acknowledge its temporal characteristics i.e. the social, economic, political, cultural and institutional processes that spatial form

embodies. In other words, the city is detached from the human processes that shape it, i.e. it is reified.

A corollary to the reification of the city is the universality of most of the models proposed. Specific spatial forms are suggested as relevant to the problems of the contemporary city in general, regardless of economic or social circumstances. Although promoted as universally valid, the suggested forms respond to specific urban contexts in North America, Australia and Western Europe. It is highly debatable whether, say, urban compaction and containment induced through planning regulations, can influence a low density North American city towards sustainability. It is, however, an entirely irrelevant and potentially detrimental prospect for any other city which has followed a different urbanisation process, spawned by different economic circumstances and conditioned by different planning traditions. Given increasing emphasis on globally co-ordinated action towards urban sustainability, through international treaties, regional blocs, and supra-national cities' networks, it is as vital to recognise the differences - spatial and temporal - among cities as it is to work in collaboration to learn from the commonalities.

Another corollary to the reification of the city is the belief, underlying most models of sustainable urban form, that spatial forms can condition human behaviour. Urban space, strictly physical and devoid of social meaning, is attributed the power to initiate a sustainable society, not only in strictly environmental terms, but also in economic and social terms. The urban sustainability discourse forms part of a wider body of criticism of the principles of orthodox modern planning, which are often blamed for many of today's urban problems. Nevertheless, universality and faith in the reformative powers of physical space were central tenets of orthodox modern planning.

The thesis responds to the above problems of the urban sustainability discourse seeking to locate the definitive themes of a new conceptual apparatus for looking at cities with a view to initiating their shift to sustainability. This conceptual apparatus aims at facilitating a process of incremental transformation or development of urban form towards sustainability, taking the specific spatio-temporal context of every city as a point of departure. In other words, its main objective is to enable programmes towards urban sustainability to emerge out of the specificity of their respective cities and be sensitive to their dynamic changes over time. No spatial form is prescribed. Four general principles of sustainable urban form, independent of context and time,

are suggested as the definitive themes of the new conceptual apparatus. They are seen as four generic steps towards urban sustainability.

These steps seek to ensure that change is guided by the uniqueness of each city rather than by universalistic models or reductionist methodologies. The first step, contextuality, intends to identify the driving forces of a city's unsustainability, in both its strictly environmental characteristics and the human processes that shape them. The second, seeks to recognise the scale or scales in which intervention can be more instrumental to initiating change. This step offers further sophistication to the first. The third introduces the imperative to view the city as a spatio-temporal rather that strictly physical or spatial entity. It seeks to illuminate the interaction between urban form and human process. Finally, the fourth step introduces the idea of time and the need for any framework to be able to respond to new circumstances and transform itself in a reflexive manner. To achieve the latter, the last step suggests, reconsideration of policy tools would be inadequate. A process of constant 'self-criticism' of the process of change needs to be initiated as part of a 'new kind of politics'. The process towards sustainability needs to be aware of its own dysfunctions and able to address them.

The second part of this thesis employs the proposed generic steps to analyse the specific urban context of Thessaloniki. An investigation of the vital operational processes of the city, using the ecosystem metaphor, illuminates a number of unsustainable characteristics in the city's energy and material flows as well as in its physical fabric. The latter is proven to have an important, but as yet neglected by official planning, role in the city's environmental performance. A brief account of the planning history of Thessaloniki, including recent responses to the plea for sustainability, illuminates a lasting failure of official planning to respond to the city's specific spatio-temporal context and hence, to control its development effectively. The step of contextuality identifies the unique combination of physical characteristics and human processes that drive Thessaloniki's unsustainability and the irrelevance of any imported model to it. It brings to light a different process of urbanisation, different spatial characteristics, different landuse and social distribution patterns, and different environmental trends from cities of advanced capitalism in North America, West Europe and Australia. Contextuality also identifies a planning framework transposed insensitively from the above contexts and irresponsive to the spatial and temporal characteristics of Thessaloniki. This lasting gap between Greek urban reality and

official plans that attempt to control it is identified among the drives of the city's unsustainability.

The second step, appropriateness of scale, suggests that, although all established scales of intervention are relevant to Thessaloniki, the scale of 'urban configurations' can play a crucial role in the transformation and/or development of its fabric towards sustainability. Urban configurations are suggested as the minimum scale of analysis of, and intervention on, the fabric of Thessaloniki. They are also suggested as an appropriate module of future development. The way urban buildings combine with each other influences their social, economic and environmental performance as well as that of the city as whole. The high density of development in Thessaloniki makes the above effects more intense. Hence, the third step, uses urban configurations as its scale of reference in its effort to explore the spatio-temporality, as opposed to mere physicality of Thessaloniki's urban form. Juxtaposition of the physical characteristics of four urban configurations to their temporal characteristics, i.e. their respective institutional framework, economic mechanism of production, socio-economic circumstances and stylistic preferences, illuminates an inextricable relationship between the two.

The last step of the proposed series towards urban sustainability, reflexivity, moves beyond the methods and tools of Greek urban planning to identify dysfunctions in the general organisational framework in which it operates. Regionalisation, vertical and horizontal integration of action, flexibility of means and genuine public participation are suggested as means towards increasing the framework's exposure to the spatial and temporal context it addresses. The dynamic nature of environmental processes as well as of economic and social processes demand a framework for the city that is capable of transforming itself essentially to respond to new conditions. The relative position of the city of Thessaloniki in a European administrative structure, the transformed political and economic situation in the Balkans and Eastern Europe and the globalised economy need to inform any attempt to direct the city's future.

The proposed steps do not define a linear process towards urban sustainability. Instead they seek to describe a cyclical process of responding to the specific spatio-temporality of different urban contexts. The concept of reflexivity ensures that, once initiated, the process is repeated cyclically, indefinitely and always redefining itself. Increasing sophistication and practicability may be the outcomes of such process in time. Employing the proposed conceptual apparatus to initiate change towards

sustainability in Thessaloniki, the thesis identifies the driving forces of its unsustainability and offers directions for action, rather than specific practical tools. Development of these directions to practicable policies for the city is necessary and urgent, but beyond the scope of this thesis.

Although Thessaloniki presents a distinct case of urbanisation, it shares many of its developmental and physical characteristics with many Mediterranean European cities. A late process of urbanisation which was not causally preceded by a process of intense industrialisation, high primacy of the capital city, lack of planning tradition and a strong informal sector responding to inadequate or non-existent state housing policy, are some of the developmental commonalities. Physical commonalities include high densities, high mixture of land uses, lack of green spaces and extensive areas of unauthorised settlements.

At present, the relative position of European Mediterranean cities to the global economy is also similar. Cities of Mediterranean Europe do not belong either to the 'core' of advanced capitalist countries or to the 'periphery' of the developing world. They belong to what Leontidou (1990) calls the 'semi-periphery'. Although, they are not 'global cities' (Sassen, 1994) i.e. they do not play a central role in facilitating the operation of global economy, they are bound to be physically and socially affected by its processes. This more recent commonality, along with their common developmental and physical characteristics, can be accommodated in the conceptual apparatus proposed in this thesis, with a view to creating a more sophisticated and practical apparatus, specific to Mediterranean European cities.

In view of increasing efforts of integrating urban policy in Europe, it is essential that the specificity of Mediterranean European cities is demarcated. The *Green Paper for the Urban Environment*, although innovative in its urban focus, exemplifies the lack of understanding of the Mediterranean European context. Based on an inappropriate generalisation of the West European experience, it attempts to interpret urban problems and form guidelines for urban development across the European Union. Contradictions arising from this approach make it clear that a common European urban policy cannot be constructed with common directions for the form, operation and development of cities across Europe.

The conceptual framework proposed in this thesis is general and independent of context. It is developed to the level of theoretical principles rather than that of practical

tools. It contains the potential to be developed further to accommodate commonalities of form and process while retaining its definitive sensitivity to contextual difference. For European cities, such commonalities will be increasingly related to international economic processes and their interaction with urban space and society and not to assumed historical and cultural homogeneity.

Nevertheless, the urban focus is crucial to the pursuit of sustainable development in a period when half the world's population lives in cities and the move towards them continues. The environmental impact of cities to the global environment, the quality of their immediate environment, the distribution of environmental degradation across the urban population and between different cities, the influence of the global economy to urban physical and social fabrics, and many others, are issues specific to cities but pertinent to global economic, social and environmental sustainability. The sustainable cities discourse identified the need to resolve the operation and development of cities as a means of addressing the future of the planet.

Despite its comprehensive and integrating mandate, this discourse has focused disproportionately on the physicality of cities which it did not relate adequately to their social and economic dimensions. Attempts to accommodate these dimensions in to ecosystemic interpretations of the city have tended to 'naturalise' them i.e. to interpret social processes as following inescapable natural laws. The third generic step towards urban sustainability, suggested in this thesis, seeks to study the relationship between form and process, between the spatial and temporal dimensions of the city, without discounting the importance of either. Research on this relationship needs to expand and contribute towards bridging the gap between social and spatial interpretations of cities and, hence, towards the development of a comprehensive theory for urban analysis and planning.

To conclude, this thesis endorses a universal scope for the project of urban sustainability. A universal scope that is not based on presumed commonalities of physical form and its effect on human behaviour. Instead, it is based on the need to resolve constantly the interaction between human process and spatial form, as a prerequisite of sustainable urbanisation and global sustainable development. Notwithstanding its emphasis on specificity, the conceptual apparatus proposed in this thesis does not promote contextual relativism. It rather seeks to facilitate a constructive encounter between universal principles and specific urban spatio-temporalities.

Understanding the relationship between socio-economic processes and physical urban space may create a more meaningful ground for the project of sustainable development to build and vindicate its universal nature. The need to resolve environmental blight and social inequality emerging from this relationship is indeed more genuinely universal than any globally operating scientifically proven 'natural' process.

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Sample Energy Calculations with LT Method 3.0 for Southern Europe

1. The Block of Intense Urbanisation

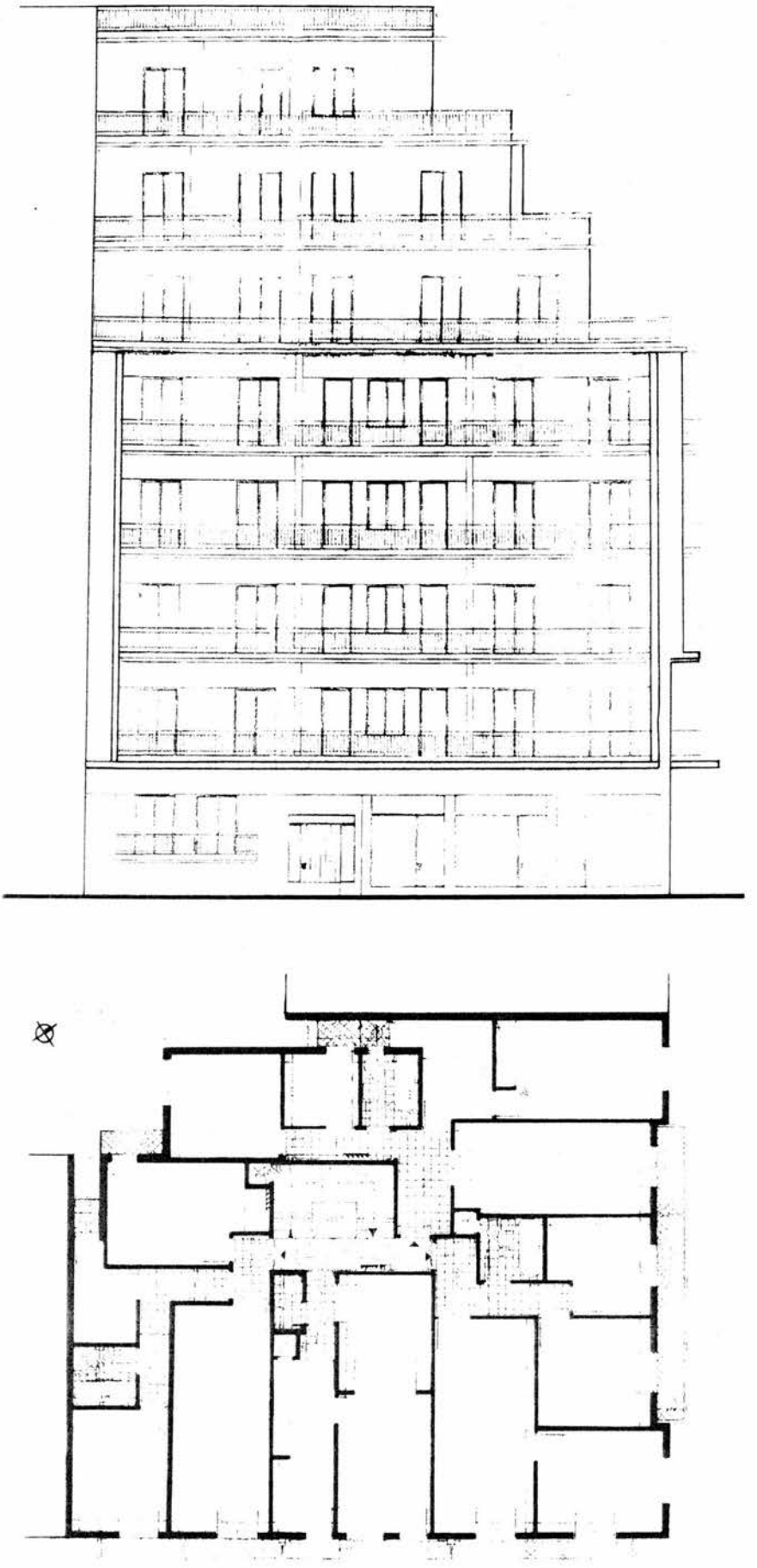

Figure 1. Plan and northwest street facade of building 4 (scale 1:200)

LT Worksheet for Building 4

	PASSIVE ZONES					NON-PASSIVE ZONES	TOTAL AREA
BUILDING DATA INPUTS	SOUTH	EAST	WEST	NORTH	ROOF		
zone area m^2	193.10	19.95	449.45	360.45		352.85	1375.85
facade glazing ratio	35	10	31.8	34.1			
LT DATA INPUTS							
lighting	0.029	0.04	0.03	0.03		0.09	
heating	0.065	0.123	0.11	0.15		0.123	
ventilation / cooling	-	-	-	-		-	

							Total MWh/y
lighting	5.60	0.798	13.48	10.81		31.75	62.45
heating	12.55	2.45	49.43	54.06		43.40	161.91
ventilation / cooling	-	-	-	-		-	-

SUMMARY	net annual primary energy consumtpion		net annual CO_2 emissions		
	MWh	KWh /m^2	t	Kg / m^2	%
lighting	62.45	45.39	13.73	9.98	23.25
heating	161.91	117.68	45.33	32.95	76.74
ventilation / cooling	-	-	-	-	-
TOTAL	224.36	163.07	59.07	42.93	100

Passivity	74%

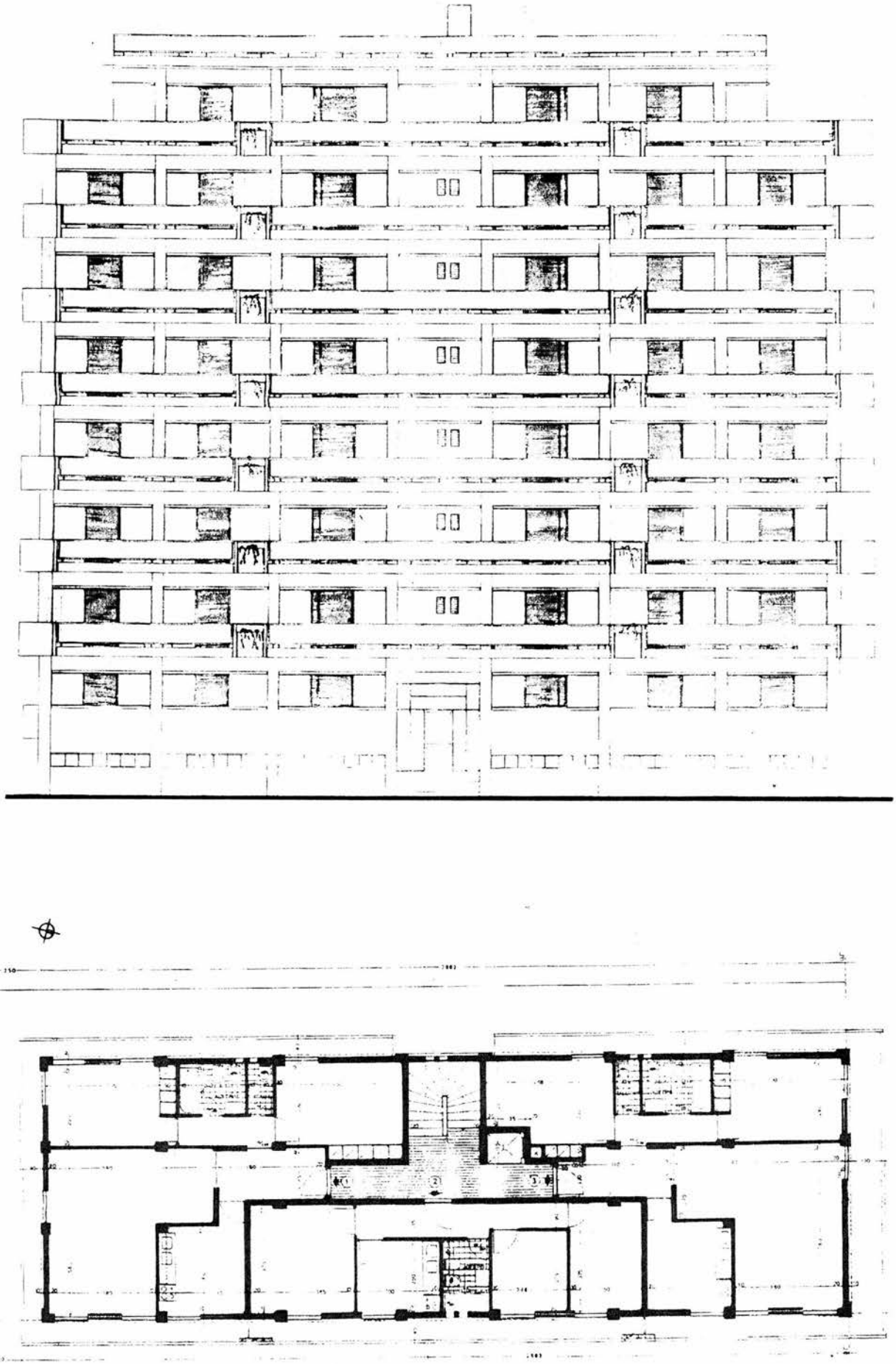

Figure 2. Plan and east street facade of 'building unit' 2 (scale 1:200)

LT Worksheet for 'building unit' 2

	PASSIVE ZONES					NON-PASSIVE ZONES	TOTAL AREA
BUILDING DATA INPUTS	SOUTH	EAST	WEST	NORTH	ROOF		
zone area m^2	306.58	641.95	419.45	-		406.24	1774.24
facade glazing ratio	19.6	29.8	15.7	19.6			
LT DATA INPUTS							
lighting	0.03	0.03	0.032	-		0.09	
heating	0.092	0.112	0.12	-		0.123	
ventilation / cooling	-	-	-	-		-	

							Total MWh/y
lighting	9.19	19.25	13.42			36.56	78.44
heating	28.20	71.89	50.33			49.96	200.40
ventilation / cooling	-	-	-				

SUMMARY	net annual primary energy consumtpion		net annual CO_2 emission		
	MWh	KWh /m^2	t	Kg / m^2	%
lighting	78.44	44.21	17.25	9.72	23.2
heating	200.40	112.95	56.11	31.62	76.47
ventilation / cooling	-	-	-	-	-
TOTAL	278.84	157.16	73.37	41.35	100

Passivity	77%

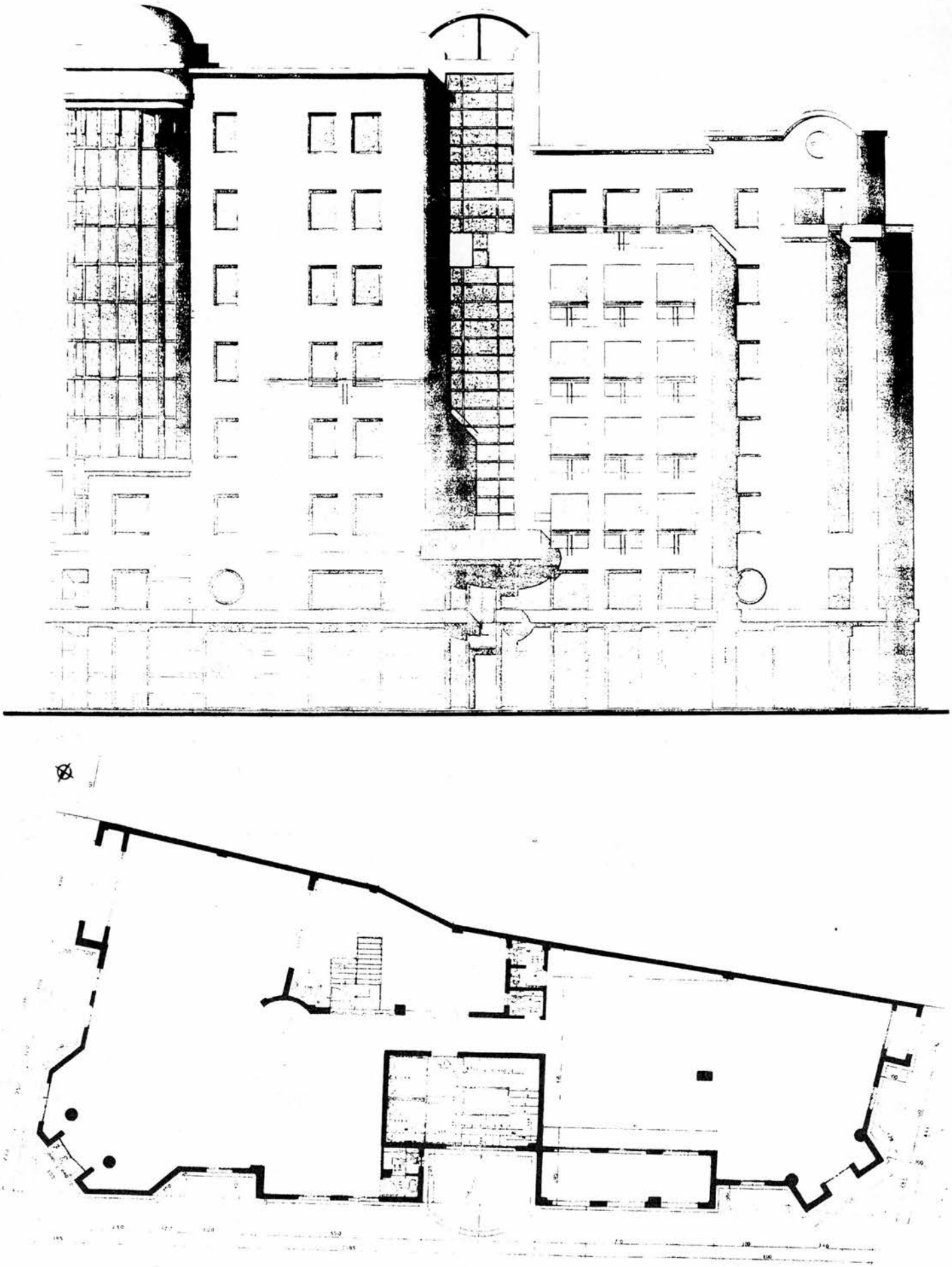

Figure 3. Plan and north street facade of building 1 (scale 1:200)

LT Worksheet of building 1

	PASSIVE ZONES					NON-PASSIVE ZONES	TOTAL AREA
BUILDING DATA INPUTS	SOUTH	EAST	WEST	NORTH	ROOF		
zone area m^2	-	495.6	252.9	546		500.5	1795
facade glazing ratio	-	42	27	37.3			
LT DATA INPUTS							
lighting	-	0.03	0.042	0.042		0.13	
heating	-	0.04	0.04	0.06		0.048	
ventilation / cooling	-	0.12	0.102	0.09		0.09	

							Total MWh/y
lighting	0	14.87	10.62	22.93		65.06	113.48
heating	0	19.82	10.12	32.76		24.02	86.72
ventilation / cooling	0	59.47	25.80	49.14		45.04	179.45

SUMMARY	net annual primary energy consumtpion		net annual CO_2 emission		
	MWh	KWh /m^2	t	Kg / m^2	%
lighting	113.48	63.22	24.96	13.90	28.13
heating	86.72	48.3	24.28	13.52	27.36
ventilation / cooling	179.45	99.97	39.47	21.99	44.5
TOTAL	379.66	211.51	88.72	49.43	100

Passivity	72%